



How IEEE has enabled my career

Tom Coughlin

2023 IEEE President Elect

iee.org



Who I am

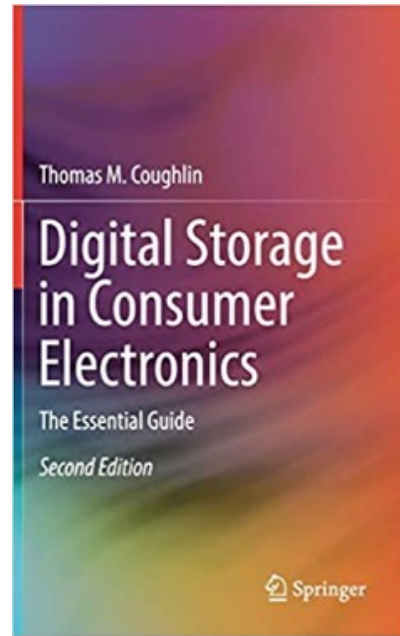
- ▶ I am originally from South Dakota and raised in the upper Midwestern US
- ▶ I have a BS Physics and an MS and PhD in Electrical Engineering
- ▶ I have an extended and diverse family in California
- ▶ I have worked for > 40 years in industry on digital storage and memory, have my own company and also write and speak regularly on storage, memory and their applications





Flash Memory is No Longer an Understudy in Media and Entertainment

Applications for Flash Memory in M&E



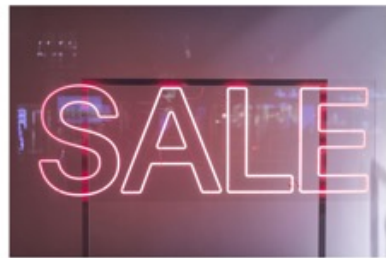
Who I am (2)

- ▶ Besides IEEE, I have been active in other professional organizations including IDEMA, SNIA and SMPTE
- ▶ I have been an IEEE member for 45 years, am an Life IEEE Fellow and also a member of HKN
- ▶ Winner of 2020 MGA Leadership Award



Tom Coughlin
Coughlin Associates

Intel Sells Its NAND Flash Business To SK Hynix



SDC
STORAGE DEVELOPER CONFERENCE
SNIA SANTA CLARA, 2017

Memories of Tomorrow
Coughlin Associates
Tom Coughlin, Coughlin Associates & Jim Handy, Objective Analysis

Magnetics Society and early history

- I joined the IEEE as a graduate student at the UoM in 1978
- My MS EE thesis was on CoCr films for perpendicular magnetic recording
- In Minnesota I worked at 3M and Nortronics before moving to Boston in 1985 to work at Polaroid on a digital storage system for an electronic camera
- In 1987, just before the digital storage group at Polaroid was disbanded I moved to Seagate Technology in Scotts Valley, CA to work on HDDs
- I have been involved in the digital storage and memory industry, based out of California, ever since



Work Experience and Other Travel

- ▶ I visited factories and vendors in Asia very often, sometimes staying for weeks at a time
- ▶ In the mid-1990's I spent some time with startup spin-offs from Ampex and Raychem and became a full time consultant in 1999 after Syquest failed
- ▶ I started and ran the Storage Visions and Creative Storage Conferences for 17 and 10 years respectively and was the general chair of the Flash Memory Summit for 10 years. I was the program chair of the FMS in 2022 and 2023.
- ▶ I have worked with companies on memory and storage all over the world
- ▶ This has led to my speaking and visiting many places to speak and work on digital storage and memory and their applications.
- ▶ My IEEE volunteer work has also lead to many opportunities to meet interesting people



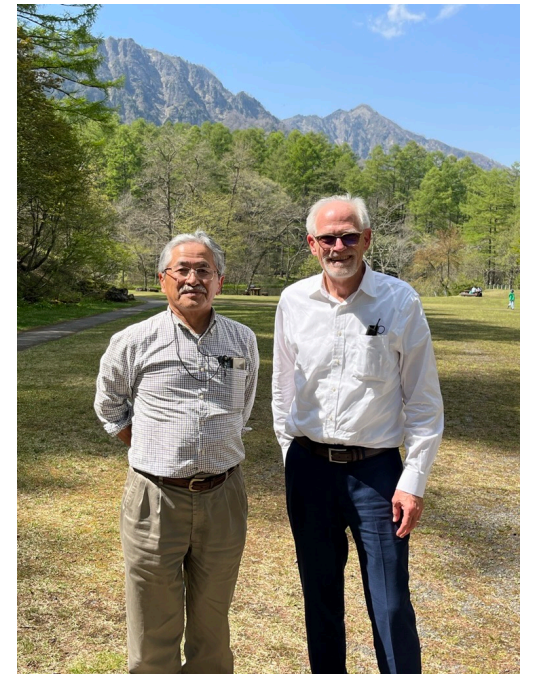
Santa Clara Valley Section

- In 1992 and again in 2002 I was chair of the SCV IEEE Magnetics Society chapter and was thus a member of the SCV section Excom
- In 2003 leaders of the SCV section asked me if I would be willing to run as an officer. I became Pace Chair of the SCV section in 2004
- In 2005/2006 I was SCV section treasurer. In 2006 I was also chair of the SCV CES
- In 2007 I was chair of the SCV section and the SF Bay Area Council
- Over the years I also formed a SSIT chapter, restarted a RAS chapter, participated in SF BAC training events and was on the board and chaired the CNSV
- The SF Bay Area Council submitted a proposal to host the 2011 IEEE Sections Congress, which was accepted
- As soon as selected for the Sections Congress, we created a volunteer team for putting the program together and fundraising to support activities at the Congress



PhD at Shinshu University

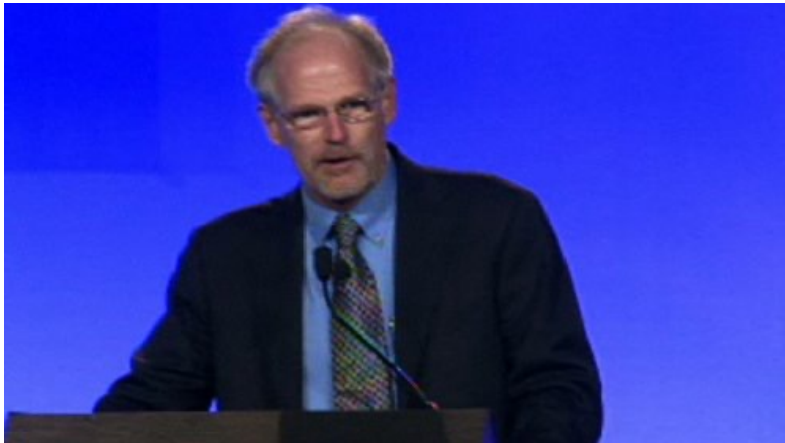
- I had an old Magnetics Society colleague who was a professor at Shinshu University in Nagano, Japan
- He told me about a program they had for people who worked in industry but with peer reviewed published papers, to use that research to get a PhD from the university after writing and defending a thesis on their work
- I started this PhD program in 2005 and then graduated in 2007.
- I made several trips to Japan doing this work, defending my thesis and attending my graduation ceremony



2011 IEEE Sections Congress



- I was general chair of the 2011 IEEE Sections Congress in San Francisco, CA
- We started planning for the 2011 Sections Congress as soon as we knew we were selected
- I attended the 2008 SC in Quebec City to find out about these events—my first Section's Congress
- We had several innovations at the 2011 Sections Congress including an event featuring local society chapters at the Computer History Museum in Mountain View and a mini-Maker Faire for children attending with their parents



IEEE Consumer Electronic Society

- I was on the IEEE CES Adcom from 2007-2012 and again from 2014-2019
- In 2010 I was membership chair of the society
- I was a distinguished lecturer (talking about digital storage in consumer electronics) from 2008-2012 and again from 2015-2016
- I served for several years as an editor for the CE Magazine and a contributor to a column on digital storage and memory in CE
- I was an editor and still serve as a reviewer for the Trans. On CE.
- I was a member of the IEEE Future Directions Committee and started and chaired a CE FD committee for several years
- I was VP of Operations and Planning for the society from 2010-2012



Three members of TEI of Piraeus IEEE Student Branch with Thomas Coughlin (second from left) and the Chapter's Chair Thanos Kakarountas (in the middle) at the lecture's venue.



Animals take to the sky during the first YP event of 2018.

IEEE Region 6 Director



- I was Region 6 Central Area chair in 2008-2009
- I was R6 Vitality Chair in 2013-2014
- In 2012 I ran for Director of IEEE R6 and won so I was Director Elect in 2013-2014
- In 2015 and 2016 I was Director of R6
- We did several things that were different than with some other directors including
 - the Aloha shirts,
 - having a region Excom meeting in Hawaii,
 - giving awards to companies (started by Mike Andrews),
 - A monthly R6 email newsletter
 - Starting the Rising Stars Conference



IEEE-USA President

- I ran for IEEE-USA President in 2017 and won, so I was the President Elect in 2018 and President in 2019
- Some of the things I did as IEEE-USA President (and Past President)
 - We distributed red, white and blue tie dyed shirts—back said “Technology for the pursuit of happiness”
 - We created and distributed “IEEE is my competitive edge” videos



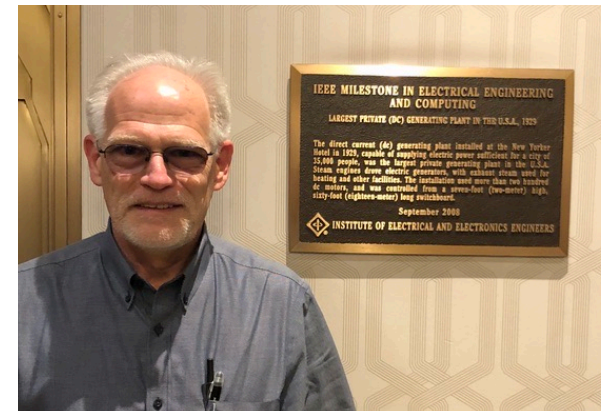
Some Other IEEE Highlights



- Member of many IEEE committees, such as:
 - Future Directions
 - New Initiatives (also chair)
 - Public Visibility (also chair)
 - Membership Price (chair)
 - Lifelong Learning
 - Sustainability
 - Industry Engagement
 - HKN Strategy
- IEEE VoLT faculty since 2013
- Member of 7 IEEE Societies.

IEEE Engineering Milestones

- I participated in the RAMAC milestone celebration in 2005 and in having a replica made for the CHM in 2022
- I worked with Steve Wozniak on the Apple I and II computer milestones while Brian Berg worked on the Macintosh milestone
- I have visited many milestone and participated in several milestone events over the years



IEEE writing and speaking

- ▶ IEEE has helped me hone my writing skills as an author, editor and reviewer
- ▶ I have also learned a lot as a conference organizer and as a speaker at many IEEE events

Effective Permeability and Imaging of Multilayered Soft Films for Perpendicular Recording Media

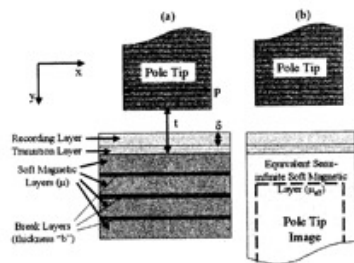
James E. Monson, *Fellow, IEEE*, and Thomas M. Coughlin, *Senior Member, IEEE*

Abstract—Thinner soft magnetic film layers show significant variation of effective permeability with wavenumber or magnetic recording density. When the magnetic material is divided between several equally thick soft layers, the effective permeability of the composite films is reduced, particularly at lower wavenumbers. At lower wavenumbers and low bulk film permeabilities, the imaging factor for soft magnetic multilayered films can be significantly reduced, making writing high coercivity media more difficult. For single pole heads, a two-dimensional analysis of writing on a perpendicular medium shows that these effects become pronounced at bulk film permeabilities less than 10. Effects on recording field gradients are much less.

Index Terms—Magnetic films, multilayers, permeability, perpendicular media, recording, soft magnetic underlayer.

I. INTRODUCTION

▶ FINITE thickness soft magnetic film has an effective



Flying Animals and the Art of Presentation

How do we make an impactful presentation? This is an important question, especially for young people in their 20s and 30s, who have so many professional (PFPs) to answer it and address such as

During the presentations, using "flying" animals, the audience had an opportunity to provide

If you record your talk, you may be able to refine it further. Then, the host speakers provided a Table presentation for an IEEE 2018 conference paper. During the presentation, some "flying" animals, the

Column: The Art of Storage

Let's Build a Holodeck!

Tom Coughlin
Coughlin Associates

▶ **Blow across** or at least for several months and recording with people through various wide ears leaves one wishing that there were better ways to connect with each other and also get out and experience the world more, even if virtually. Some of today's virtual reality and augmented reality experiences are really amazing, but they just are not a real replacement for being somewhere else. As an old Star Trek fan, what I really want is a holodeck like that shown in Figure 1.

So, what would it take to create an immersive environment like the holodeck? Well we are probably many years away from master construction and have fields but can we create a holographic environment where images seem to materialize with real depth, giving a feeling of presence missing from normal flat displays? Today's VR and AR content can create a lot of capacity and bandwidth.

Creating a real immersive virtual illusion may require volumetric imaging which processes and stores all of the light from all directions around an imaged object. Such volumetric images can be displayed with a real holographic display with full depth and a flat image can be viewed with the local point changed on demand. Volumetric images require much more storage capacity and bandwidth than traditional images at a given resolution. It is things like this that are driving the explosion in data generation and required storage capacity. Jon Karolis, a founder of Light Field Lab, said that they have been developing a holographic display technology that could be miniaturized and scaled to create a volumetric image on a panel and over the wall of a room. Figure 2 shows what such a holodeck wall would look like.

BIAS AND DIVERSITY IN ENGINEERING

by Tom Coughlin 29 Jun 2020



Recent national and international protests against police violence (sparked by the death of George Floyd in Minneapolis) and non-uniform justice for black people, has highlighted problems with institutional racism. The IEEE President, President-Elect and Past President made a short statement about their opposition to hatred and discrimination: "IEEE is, and remains, strongly committed to diversity, equity, and inclusion and we see no place for hatred and discrimination in our communities."

Greek Chapter Starts Its Life Cycle with Distinguished Lecturer Talk

The IEEE Greece Section CE Society Chapter is a newly established chapter in Region 5 and has celebrated its initiation with an open lecture by Thomas Coughlin (president, Coughlin Associates), a distinguished lecturer of CE Society. The event took place at the premises of Corallia Centre Institute on Monday, 12 September 2017. The lecture was titled "Storing Your Life: Consumer Digital Storage—Personal, Shared, Hierarchical and Virtual" and attracted 25 attendees. The lecture was videotaped to allow the enterprise members of Corallia's members and to Patras (Patras Science Park). The lecture was mainly attended by IT professionals and by students of the TEE of Patras, IEEE Student Branch.



These members of TEE of Patras IEEE Student Branch with Thomas Coughlin (second from left) and the Chapter's Chair Thomas Kakouris (in the middle) at the lecture's venue.

Digital Storage and Memory Technology (Part 1)
Tom Coughlin, Roger Moyal, and Jim Handy
November 2017

A Cross-Standard Metadata Formatting Structure

Scott L. Linford, *Senior Member, IEEE*, Thomas Coughlin, *Senior Member, IEEE*

Abstract—Over the past 10 years, the amount of user-generated content has increased at phenomenal rates. However, due to a lack of common content descriptors, reliable website searches and access to this content is becoming increasingly difficult. There are third party products available that allow metadata descriptors to be created automatically but the formatting may not be compatible with the website database. With so many different standards for metadata, the whole area is becoming effectively de-standardized. This paper will present a cross-standard formatting platform that will allow compatibility between standards.

Index Terms — Metadata, standardization, cross-standard, topology.

I. INTRODUCTION
As revenues are increasing in the media space, there is also an increased amount of content in the sector and it has been estimated (2) that storage requirements will

IEEE writing & speaking

- I have given many talks during during my career and many for the IEEE

IEEE DigitalReality TWITTER CHAT IEEE

AI in Digital Reality: This Ain't No Foolin' Around

Wednesday, 7 October 2020 at 9am PT / 12pm ET

FEATURING:

- Tom Coughlin**
President, Coughlin Associates
IEEE Fellow
- Nicholas Napp**
Co-Founder of Xmark Labs, LLC

An IEEE Future Directions Production #IEEEDRChat

ICCE 2019

EXPERT PANEL 2: FOG/EDGE COMPUTING
Tom Coughlin (Coughlin Associates, IEEE USA)

Dr. Tom Coughlin
Rising Stars 2020 Speaker
President, Coughlin Associates
IEEE-USA President 2019

RISING STARS CONFERENCE

brilliant minds
BRIGHT FUTURES
IEEE SECTIONS CONGRESS 2017
11-13 AUGUST | SYDNEY, NSW, AUSTRALIA | ICC SYDNEY

Tools for Section Chapter Meeting Recording and Distribution

Tom Coughlin
Past Director, Region 6
VP IEEE USA Professional Activities
Chair 2011 IEEE Sydney Congress

ICCE 2020

Internet of Things (IoT)

- Applications/Devices
- Architectures (Edge, Fog, Cloud)
- Privacy
- Security
- Informed consent
- Power
- Remediation
- Government
- Standards
- Barriers to entry
- Leap frog competitive positioning
- Intellectual Property

INTERNET OF THINGS (IOT)
Thomas Coughlin (Coughlin & Associates Ltd.)

Tom Coughlin
IEEE Sr Member

HD, 4K, 8K... then what?



IEEE Technology,
DigitalTwins,
DNA Storage
and More
with
Thomas Coughlin



IEEE
CES ASIA 观察室

Tom Coughlin
President, Coughlin Associates
IEEE Fellow

2020 Volunteer Leadership Training Program

Dealing with Difficult People

22 September 2020

Tom Coughlin – IEEE-USA Past President, former SCV Section Chair

Consulting in California:
Understanding AB 5,
and Keeping Your
Independence

12 November 2019

Featuring a panel of 6 speakers:

- Brian Berg
- Tom Coughlin
- Russ Harrison
- Chris Schaefer, JD
- Giacomo Vacca
- Walt Maclay

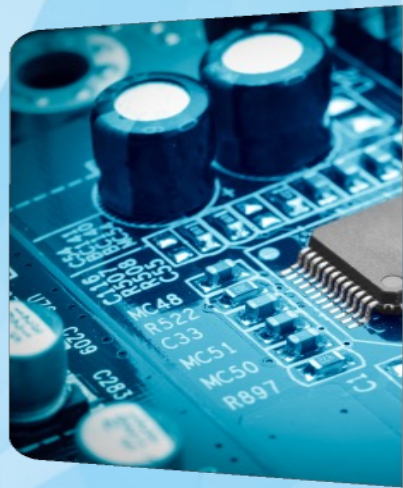
IEEE-USA PATCA



IEEE networking

- ▶ I have met many people through the IEEE
- ▶ Volunteer leadership can let you meet Rock Stars





The Future of IEEE

*Tom Coughlin, 2023 IEEE President Elect
President, Coughlin Associates, Inc.
<https://tomcoughlin.com>
Email: tom@tomcoughlin.com*

IEEE: Your Resource For Technology Decisions

- Technology of all sorts drive the world's economy
- IEEE is the largest technical professional organization in the world
- IEEE members are involved in all aspects of technology creation and use
- IEEE research powers patents and IEEE creates world's technical standards
- IEEE fosters efforts in future directions, technical roadmaps and tracking megatrends
- IEEE can inform public policy and is a resource for technical discussions



My Priorities for 2024



- ▶ Increasing our retention of younger members
- ▶ Increase our engagement with industry
- ▶ Increasing our outreach to the broader public
- ▶ Make investments in new products and services

Retaining our Younger Members

- The average age of IEEE higher grade members (excluding GSMs) is 51, and it is 55 in the US
- The overall average member age is about 44 years due to our large student membership
- Annual renewal of student members to become Higher Grade members from 2016 through 2021 was about 15%.
- IEEE Young Professional annual retention rates are under 60%
- Transitioning student to YP members and retaining them is vital to keeping IEEE vital and relevant!



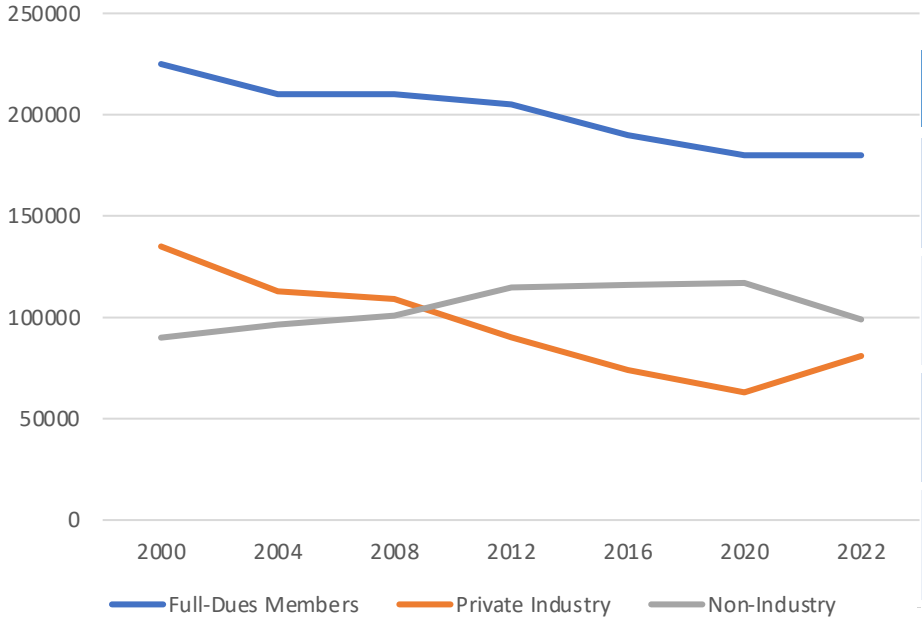
Retaining our Younger Members cont.

- How can we retain our younger members and thus keep IEEE relevant and vital?
- I believe that an important element in this is creating a sense of community among IEEE members
- At the local section level, we need to engage our YP members
- Many members would like to help, they are just waiting to be invited
- IEEE can create resource to support talks to student branches and perhaps help with connections with industry for job fairs, etc.



Declining Industry Presence

IEEE faces a significant foundational and financial threat to its mission, but also an opportunity



	2000	2004	2008	2012	2016	2020	2022
Full-dues Members	225,000	210,000	210,000	205,000	190,000	180,000	180,000
Private Industry	60%	54%	52%	44%	39%	35%	45%
Private Industry	135,000	113,400	109,200	90,200	74,100	63,000	81,000
Non-industry	90,000	96,600	100,800	114,800	115,900	117,000	99,000

Source: IEEE Research

Strengthening our Value to Industry and IEEE Members Working in Industry

- This will require work at the local section level as well as by various IEEE Organizational Units
- Get members from industry involved in your local section leadership
- Work with your local companies
- Participate in local trade shows (exhibits, talks)
- Recognize local companies for their activities
- I want to get IEEE engaged with industry and believe that this is also an important element in retaining and attracting younger members
- IEEE organizational units must be part of this effort!



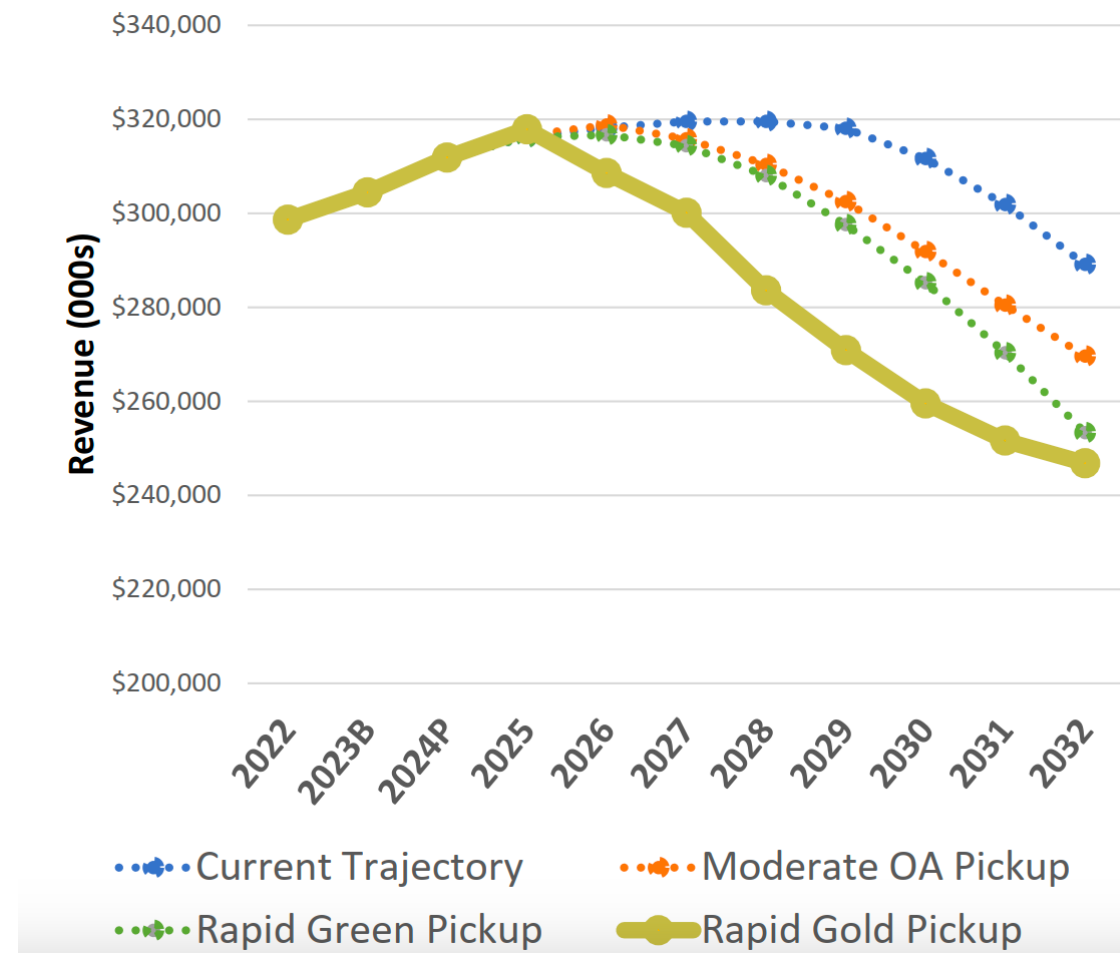
Informing the Broader Public about IEEE



- Did you know:
- IEEE publications are cited 3x more than any other publisher in the top 50 patenting organizations worldwide
- IEEE members have won 21 Nobel Prizes so far
- IEEE members filed over 143,000 patents last year
- IEEE has over 1,300 active standards with more on the way that standardize the internet, the metaverse, blockchain, etc.
- IEEE publishes 3 out of the top 5 publications on AI, Automation and Control Systems, and Computer Science HW and SW
- We need to participate in opportunities to talk to non-IEEE groups about IEEE

Investing in IEEE Strategic Objectives

- In 2024, it will be time to work on IEEE Strategic Goals out to 2030
- I would like to have the IEEE make significant investment in the development of new products and services
- I would like us to invest in IT and other capabilities to provide resources and services that are of value to our members and customers and enable us to continue our mission.



June PSPB Report on Impact of Open Access

IEEE Strategic Plan 2020-2025

www.ieee.org/strategic-plan

Approved by the IEEE Board of Directors, November 2019

OUR MISSION

We foster technological innovation and excellence for the benefit of humanity.

OUR VISION

We will be essential to the global technical community and to technical professionals everywhere, and be universally recognized for the contributions of technology, and of technical professionals in improving global conditions.

CORE VALUES



IEEE WILL:



Drive global innovation through broad collaboration and the sharing of knowledge



Enhance public understanding of engineering and technology and pursue standards for their practical application



Be a trusted source of educational services and resources to support life-long learning



Provide opportunities for career and professional development



Inspire a worldwide audience by building communities that advance technical interests, inform public policy, and expand knowledge for the benefit of humanity



IEEE will foster a collaborative environment that is open, inclusive, and free of bias and will continue to sustain the strength, reach, and vitality of our organization for future generations.

Other Priorities for 2024

- Funding professional IEEE Competitive Edge Videos—done, \$100k over two years
- Meet needs of industry professionals—pilot of Industry Professional affinity group—pilot program started
- Future Jobs and the Future of Technical Education—Creating an IEEE BoD adhoc in 2024
- MoH and Early Career Award Event Funding-- Creating an IEEE BoD adhoc in 2024
- Making IEEE BoD more effective, especially 3-P's
- Expanding DataPort—done, spending \$1M to increase users to 10M
- Climate Change, Sustainability and Other Mission Activities



*Advancing Technology
for Humanity*

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Tom Coughlin

2023 IEEE President-Elect

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