

# IEEE Systems Council AdCom Meeting

September 21, 2018

Gaylord National Resort & Convention Center  
Baltimore 3

Jose L 'Pepe' Contreras-Vidal (RAS)

## IEEE Brain Initiative Roadmapping Activities



# BACKGROUND: IEEE BRAIN Initiative

- Systems Council is a participating OU of IEEE Brain.
  - Pepe Contreras-Vidal represents the Systems Council in IEEE Brain
- The IEEE New Initiative Committee (NIC) granted 3y funding to support IEEE Brain Initiative in 2018.
- IEEE Brain is expected to be integrated into *IEEE operations* when NIC funding ends in 2020.
- IEEE Brain is forming a *Transition Subcommittee* to explore various models to continue this interdisciplinary, cross-society effort.

# About IEEE Brain

The mission of IEEE Brain is to facilitate cross-disciplinary collaboration and coordination to advance research, standardization and development of technologies in neuroscience to help improve the human condition.



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**IEEE** brain

# Introduction

## ➤ Mission/Goal:

- The IEEE Brain Initiative is dedicated to advancing technologies that improve our **understanding of brain function**, revolutionizing our current abilities to **reverse engineer neural circuits** in both the central and peripheral nervous systems, and developing **new approaches to interface the brain with machines** for augmenting human-machine interaction and mitigating effects of neurological disease and injury.

## ➤ Why Now:

- We are in the midst of **massive global efforts, across government, academia, and industry**, focusing on brain research and new technologies to transform our understanding of the brain to treat diseases and to improve lives
- **IEEE Brain** was formed in fall of 2015 as an **IEEE wide effort to complement and support these worldwide Brain Initiatives and neuroscience efforts**
  - IEEE brings innovative technologies and tools to the field of neuroscience
  - IEEE provides unbiased technology directions (**Roadmap**) that can help guide budget and funding decisions
  - IEEE **facilitates cross disciplinary collaboration and coordination** bringing solutions that address the entire technology chain to **accelerate commercialization**

# IEEE Brain Stakeholders

## ➤ Involvement from several IEEE Societies, Councils, and OUs



## ➤ Building relationships with

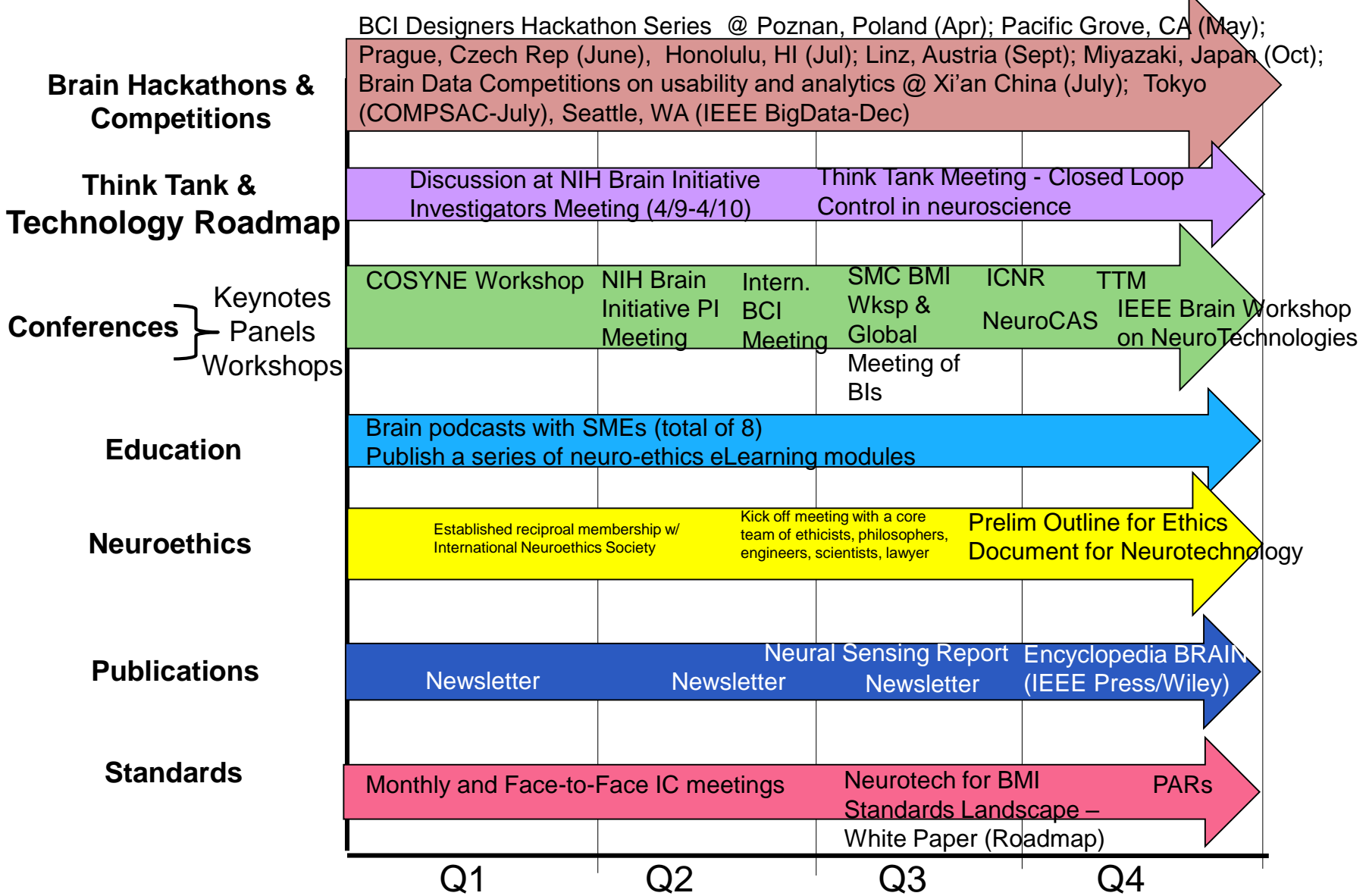
- Federal agencies involved in White House BRAIN Initiatives
- Global brain initiatives launched in other countries
- The Kavli Foundation
- International Neuroethics Society (INS) and the neuroethics community
- Industry Players

# IEEE Brain Core Team

- **Initiative Co-Chairs** : Paul Sajda (Columbia), Jose Carmena (UC Berkeley), Jacob Robinson (Rice)
- **Senior Advisors**: Metin Akay (Univ of Houston), Michael H. Smith (UC Berkeley)
- **Conferences Subcommittee Chair**: Grace Rigdon (GCR Consulting)
- **Standards Subcommittee Chair**: Ricardo Chavarriaga (EPFL)
- **Publications Subcommittee Chair**: John Moreland (NIST)
- **Global Brain Competitions Co-Chairs**: Narisa Nan Chu (CWLab International), Christoph Guger (g.tec), Seth Elkin Frankston
- **Education Subcommittee Chair**: Reza Abbasi-Asl (Allen Institute for Brain Science)
- **Industry Advisory Subcommittee Chair**: Doug Weber (Univ of Pittsburgh)
- **Neuroethics Subcommittee Chair**: James Giordano (Georgetown Univ)
- **International Neuroethics Society Liaisons**: Peter Reiner (Univ of British Columbia), Laura Cabrera (Michigan State)
- **NIH Representative**: David McMullen
- **NSF Representative**: Uri Hasson
- **IEEE Program Manager**: Sin-Kuen Hawkins
- **IEEE Futures Directions Advisor and BDI Liaison**: Kathy Grise
- **Brain Transition Subcommittee (in formation)**: TBA (SC represented by Pepe)



# 2018 IEEE BRAIN Program



## Potential (New) Activities for Systems Council

- **IEEE BRAIN**
  - Increase SC presence in IEEE Brain:
    - SC in IEEE Brain transition subcommittee
    - Currently, IEEE Brain activities mainly involve EMB & SMC (e.g., conferences/ workshops/ competitions)
    - SC in Standardization efforts by IEEE BRAIN
      - Interoperability
      - Hybrid systems of systems: Neurorobotics
      - BCI systems as consumer electronics
    - Organize SC-sponsored BRAIN Community Groups. Being tied to an IEEE Section will provide an avenue for IEEE BRAIN to send funding to support initiative related events.
    - SC-sponsored special Issues on Neurotechnology



# IEEE New Initiative Program (NIC) and Roadmapping

- Review main characteristics of NIC Program (from <https://www.ieee.org/about/corporate/initiatives/initiatives-faqs.html>)
- Roadmap Example: International Roadmap for Devices and Systems (IRDS) sponsored by the IEEE Rebooting Computing Initiative (RCI)

# IEEE New Initiatives Program

## What is the purpose of the IEEE New Initiatives Program?

The new initiative program is designed to support potential new programs, products, or services that will provide significant benefit to IEEE members, the public, the technical community, and customers, or which could have lasting impact on IEEE or its business processes. Initiatives must be of strategic importance to IEEE.

## What is the minimum funding request for a new initiative?

Typically, new initiatives are expected to require US\$100,000 or more for a 12-month period. However, any project proposed to the [New Initiative Committee](#) with a total budget exceeding US\$40,000 will be considered a new initiative. Multi-year funding is allowable for new initiatives, with a maximum of up to three 12-month periods.

The seed grant proposal should be used for smaller-scale or high-risk proposals when funding of US\$40,000 or less is required and the project to be completed in a 12-month period.

## How do I submit a New Initiative Proposal?

New initiative proposals may be submitted at any time during the year by completing the [New Initiatives Preliminary Proposal](#) (DOC, 111 KB) and e-mailing it to [newinitiatives@ieee.org](mailto:newinitiatives@ieee.org). The form requires basic information such as a project description with expected outcomes, initiative leader, volunteer champion, costs, timetable, and other information required for evaluation. Stage two of the New Initiatives process requires the submission of a [Full Proposal and Project Plan](#) (DOC, 216 KB) after acceptance of the preliminary proposal.

# IEEE New Initiatives Program

## What does the New Initiatives Committee look for in a proposal?

The new initiative program is designed to support potential new IEEE programs, products, or services that are of strategic importance to IEEE. Here are criteria that NIC uses to evaluate proposals.

- Completion of the project will further the strategic goals of IEEE
- A well-defined purpose or need statement for the program, product, or service
- The quality, innovation, and creativity of the project balanced by its likelihood of success
- A clear and realistic plan for successful completion of the project, including key milestones and objectives
- The project is scalable and broad enough to make an impact on the larger IEEE organization
- The proposal includes measurable outcomes and has an effective method to measure the success of the project
- The proposal includes a viable plan for the financial sustainability of the project after the NIC funding ends
- An initiative leader has been named and a capable team of volunteers has been identified
- The project leader has expertise to conduct the project

## Why does the project need an IEEE staff project manager?

Staff project managers will support the initiative leader and volunteer team. They will engage appropriate IEEE stakeholders in the project and coordinate resources, monitor schedules and budgets, provide an ongoing picture of progress, status, and issues, and interact and communicate with the project team. The project manager will ensure communication and coordination of work activities and the integration of resources and project components.



# IEEE Roadmaps Strategy and Governance (IRSG)

*Jim Jefferies IEEE CEO; Kathy Land IEEE TAB Vice President  
Rakesh Kumar IRSG Chair  
6/22/18*





*from IEEE Releases the International Roadmap for Devices and Systems (IRDS)*

*IEEE Rebooting Computing (IEEE RC) Initiative fosters global collaboration on tracking industry trends and projecting technology requirements to advance the computing ecosystem*

**PISCATAWAY, NEW JERSEY, USA, 06 June 2018** – IEEE, the world's largest technical professional organization dedicated to advancing technology for humanity, today announced the release of the 2017 edition of the International Roadmap for Devices and Systems (IRDS),...

According to Paolo A. Gargini, IEEE and Japan Society of Applied Physics (JSAP) Fellow, and Chairman of IRDS, “Over the past decade the structure and requirements of the electronics industry have evolved well beyond the semiconductor’s industry requirements. In line with the changes in the new electronics ecosystem, the **2017 IRDS has integrated system requirements with device requirements** and identified some new powerful solutions that will support and revolutionize the electronics industry for the next 15 years.”

According to William Tonti, IEEE Fellow and IEEE Future Directions Sr. Director, “The IRDS presents an **end-to-end continuum of computing** as requirements evolve into multiple platforms.”

## *from* **IEEE Releases the International Roadmap for Devices and Systems (IRDS)**

*(continued)*

....

**"This is the first comprehensive roadmap of the electronics industry that starts by addressing applications needs, and then drills down all the way to identifying materials, device and manufacturing needs.** At a time when the industry is at an historic inflection point, the **IRDS 2017 roadmap points the way to the future,**" said IEEE Fellow Thomas M. Conte, co-chair, IEEE Rebooting Computing Initiative, Vice-Chair of IRDS, and Professor, Schools of Computer Science, and Electrical and Computer Engineering, Georgia Institute of Technology.

....

"It is important that we come together to build a comprehensive roadmap for computing devices and systems that takes into account a wide range of domains and input from **global stakeholders committed to advancing the computing ecosystem** with IoT edge and CPS devices" said Yoshihiro Hayashi, IRC and Chairman of SDRJ. "In doing so, we can better ensure that computing meets the technology demands from a

*from* **IEEE Releases the International Roadmap for Devices and Systems (IRDS)**

*(continued)*

**“The IRDS represents a global effort to ensure the continued evolution of computing is fully aligned with industry needs and is prepared to meet the technological challenges as we move towards an even greater connected digital world,”** said Francis Balestra, NEREID Coordinator. **“We are encouraged that our cooperation with the IRDS will lend perspectives to assist in its overall mission,”** said Enrico Sangiorgi, Director of SiNANO.

**“As the global industry association representing the electronics manufacturing supply chain, SEMI is pleased to continue to partner with IEEE to provide what we see as critical industry validation for this and future technology roadmaps,”** said Ajit Manocha, President and CEO, SEMI.



# International Roadmap for Devices and Systems



INTERNATIONAL ROADMAP FOR DEVICES AND SYSTEMS

**Sponsored by the IEEE Rebooting Computing Initiative (RCI)**

THE IRDS IS DEvised AND INTENDED FOR TECHNOLOGY ASSESSMENT ONLY AND IS WITHOUT REGARD TO ANY COMMERCIAL CONSIDERATIONS PERTAINING TO INDIVIDUAL PRODUCTS OR EQUIPMENT.

**THE INTERNATIONAL ROADMAP FOR DEVICES AND SYSTEMS: 2017**  
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(from: [https://irds.ieee.org/images/files/pdf/2017/2017IRDS\\_ES.pdf](https://irds.ieee.org/images/files/pdf/2017/2017IRDS_ES.pdf))

# International Roadmap for Devices and Systems

## IRDS MISSION

Identify the roadmap of electronic industry from devices to systems and from systems to devices.

## IRDS STRUCTURE

This initiative focuses on an International Roadmap for Devices and Systems (IRDS) through the work of International Focus Teams (IFT) closely aligned with the advancement of the devices and systems industries. Led by an international roadmap committee (IRC), IFTs collaborated in the development of the 2017 IRDS roadmap, and engaged with other segments of the IEEE, such as Rebooting Computing Initiative (RCI), Electron Devices Society (EDS), Computer Society (CS), Communication Society (ComSoc), and also with related industry communities like the System and Device Roadmap Japan (SDRJ) and the European SINANO Institute (ESI) in complementary activities to help ensure alignment and consensus across a range of stakeholders, such as:

- Academia
- Consortia
- Industry
- National laboratories

IEEE, the world's largest technical professional organization dedicated to advancing technology for humanity, through the IEEE Standards Association (IEEE-SA) Industry Connections (IC) program, supports the IRDS to ensure alignment and consensus across a range of stakeholders to identify trends and develop the roadmap for all the related technologies in the computer industry.

**THE INTERNATIONAL ROADMAP FOR DEVICES AND SYSTEMS: 2017**  
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(from: [https://irds.ieee.org/images/files/pdf/2017/2017IRDS\\_ES.pdf](https://irds.ieee.org/images/files/pdf/2017/2017IRDS_ES.pdf))

# International Roadmap for Devices and Systems

## IEEE SPONSORS

The IRDS is sponsored by the [IEEE Rebooting Computing \(IEEE RC\) Initiative](#) in consultation and support from many IEEE Operating Units and Partner organizations including:

CASS—[Circuits and Systems Society](#)

CEDA—[Council on Electronic Design Automation](#)

CPMT—[Components, Packaging and Manufacturing Society](#)

CS—[Computer Society](#)

CSC—[Council on Superconductivity](#)

EDS—[Electron Devices Society](#)

MAG—[Magnetics Society](#)

NTC—[Nanotechnology Council](#)

RS—[Reliability Society](#)

SSCS—[Solid State Circuits Society](#)

SRC—[Semiconductor Research Corporation](#)

[IEEE Standards Association](#)

Action item for consideration: Should Systems Council join IRDS?

THE INTERNATIONAL ROADMAP FOR DEVICES AND SYSTEMS: 2017

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(from: [https://irds.ieee.org/images/files/pdf/2017/2017IRDS\\_ES.pdf](https://irds.ieee.org/images/files/pdf/2017/2017IRDS_ES.pdf))

# International Roadmap for Devices and Systems

## INTERNATIONAL SPONSORS AND COOPERATION

There are several international roadmap efforts directly aligned with the IRDS:

- European SINANO Institute (ESI) and NanoElectronics Roadmap for Europe: Identification and Dissemination” (NEREID) <https://www.nereid-h2020.eu>
- The System Device Roadmap Committee of Japan (SDRJ) <https://sdrj.jp/>
- The International Electronics Manufacturing Initiative (iNEMI) [www.inemi.org](http://www.inemi.org)

# IEEE Roadmaps Strategy and Governance

## IRSG Adhoc - The Need

- ❑ The number of Roadmaps within IEEE is increasing
  - IRDS, 5G, HIR, ITRW, Robotics, Neuro,..
  - IEEE is a trusted source of IP (Pubs, Events, STDS, Educ.)
    - Roadmaps are a natural addition
    - Coordination in TAB
  
- ❑ IEEE Jim Jeffries asked TAB to create the infrastructure for a Roadmap AdHoc (IRSG) **IEEE Roadmaps Strategy and Governance**
  - **Focus on Leadership, Strategy, and Governance**
  
- ❑ **Roadmaps require: internal policies, procedures, and guidelines**
  - **Coordinate, Solve Problems, Identify Need, Business Models**

# IRSG Adhoc - Goals and Objectives

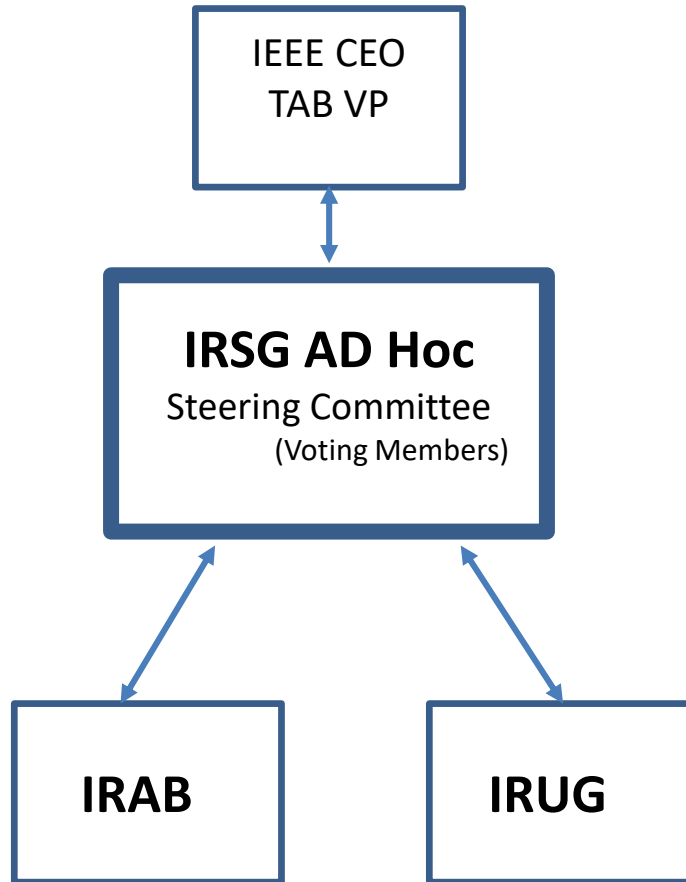
- Integrate, and provide Leadership for Roadmap activities within the IEEE
  
- 2018 Team Goals: Focus on developing the infrastructure for Roadmaps
  - Committee(s) membership, scope
  - Policies and Procedures
  - Strategy
  - Governance
  - Structure
  - Roadmap Vetting
  - Business Model(s)

# IRSG Adhoc - Proposal

- ❑ IRSG vetted through Jim Jeffries, Steve Welby 4/10/18
- ❑ Present outline of IRSG Adhoc
- ❑ IRSG comprised of 6-8 voting members
- ❑ IRSG contains two non voting bodies
  - An Industry Advisory Board (IRAB )
  - An IEEE Roadmaps Users Group (IRUG)



# IRSG AdHoc Structure



## IRSG Adhoc - Detail

- ❑ IRSG Chair: Rakesh Kumar
  - o Add IEEE Voting Members (*in process*)
  - o Function: Strategy and Governance
  
- ❑ IRAB: Team members selected by IRSG chair (*in process*)
  - o Function: Assist in identifying roadmap needs
  - o Team consists of broad industry leaders
  
- ❑ IRUG: Team members selected by IRSG chair
  - o Function: Provide User Group Forum
  - o All IEEE Roadmaps (delivered, planned, future)
  - o Status: All IEEE Roadmaps are represented in the IRUG

# IRSG Impact to TAB

## **2018**

- ❑ Funding through Future Directions \$60K (*S. Diamond*)
  - o Supports Committee work, Governance Documents
  - o One FTF meeting
  - o Staffing: 1 Part time IEEE staff:
    - Write governance documents
    - Conduct web-ex meetings, control agenda and meeting minutes / action items
    - ~10% high level staff support (Roadmap vetting, pursue business models)

## **2019 and beyond**

- ❑ Decide if IRSG moves from an adhoc to full committee
- ❑ If yes, is it a committee of TAB, or is it a committee of the IEEE BOD
  - o Funding and staffing plan to be defined

# IRUG Members by Roadmap

	IRDS	5G	HIR	ITRW	Robotics	Neuro	Hardware
IRUG Members	Paolo Gargino	Ashutosh Dutta	Bill Chen	Peter Wilson	Dominik Boesl	Paul Sajda	Dylan Williams
	Bruce Kraemer	Timothy Lee	Bill Bottoms	Brahm Ferreira			
	Elie Track						
	Tom Conte						

## Responses – Best Practices Questionnaire

1. *If you were embarking on developing your roadmap all over again, please list 2 Best Practices that would help the process.*

- Better Collaboration
- Better Coordination
- Customer Viewpoint

2. *The 2 most frustrating factors affecting your roadmap development efforts.*

- Poor Collaboration
- Narrow focus
- Customer buy-in
- Volunteer time

5. *Please list 2 recommendations for the IEEE Roadmaps Ad Hoc committee*

- Unified Roadmap
- Avoid duplication
- Guidelines
- Devices to systems
- Encourage volunteers
- Tools & Framework

6. *How are you addressing Sustainability within your roadmap?*

7. *How can the Roadmap Strategy and Governance team help?*

- Community buy-in
- Encourage volunteers

- Single Roadmap
- Unified effort
- Efficient framework
- Common processes