

Quality & Safety, Medical Physics, and AAPM

Perspectives from the President-Elect

Rod Pawlicki, PhD, FAAPM, FASTRO

AAPM President-Elect

Professor and Vice-Chair

Department of Radiation Medicine & Applied Sciences

UC San Diego Health

RETHINKING MEDICAL PHYSICS

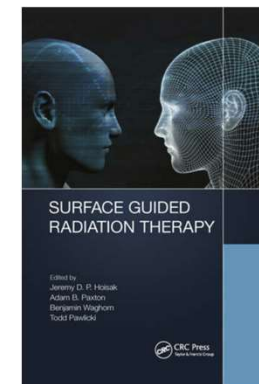
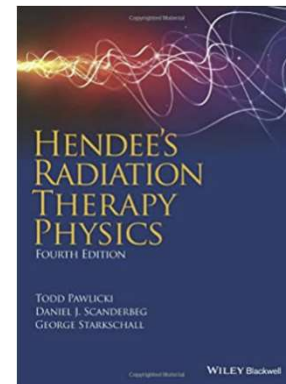
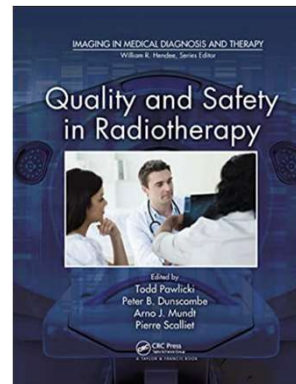


closures

Founding partner



Book Royalties



Funding



Outline

Bit of background about me

Quality & Safety

AAPM

Questions / Suggestions

Clinical / Academic Background

- 1991 M.S. in Physics, DePaul Univ
- 92-94 Clinical Physicist, Univ of Pittsburgh
- 94-98 Ph.D. Medical Sciences, Medical College of Ohio
- 98-00 Postdoctoral Fellow, Stanford Univ
- 00-06 Clinical Faculty, Stanford Univ
- 07-Pres Clinical Faculty, Physics Chief, UC San Diego



AJ Mundt, MD
Chair, UC San Diego

CAMPEP Board
TG-100 Author
Honorary AAPM Member



1993



2003

AAPM / ASTRO Background

AAPM

- 2002 Computer Committee
- 2005 WGPE
- 2013 Board Member at Large
- 2015 Board of Directors (Secretary)
- 2016 Medical Physics 3.0
- 2021 Workgroup on Optically Guided Intervention

ASTRO

- 2007 Technology Evaluation SC
- 2009 Multidisciplinary QA SC
- 2012 CAQA Committee
- 2016 Board of Directors
 - Chair, Clinical Affairs & Quality Council
- 2018 Nominating Committee

Equipment and Quality Assurance

1990's

2020's

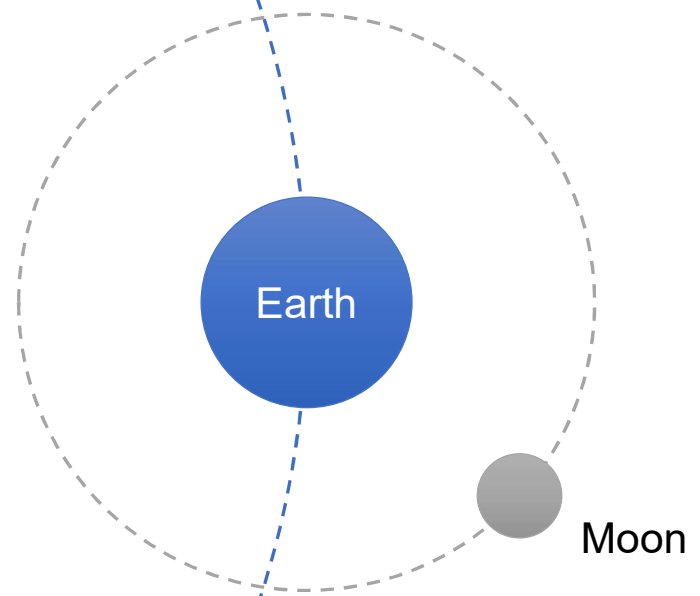
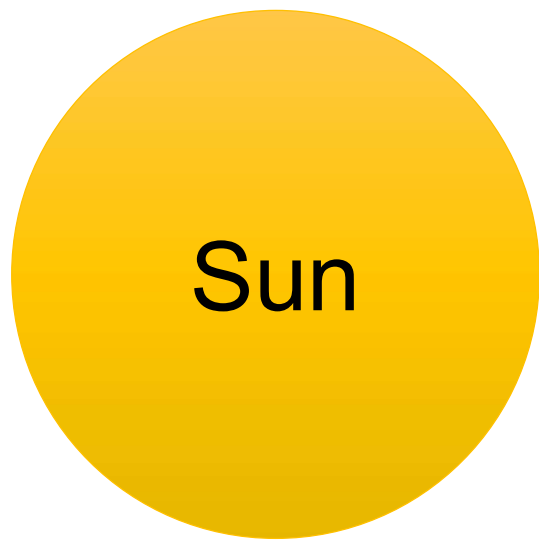
Equipment



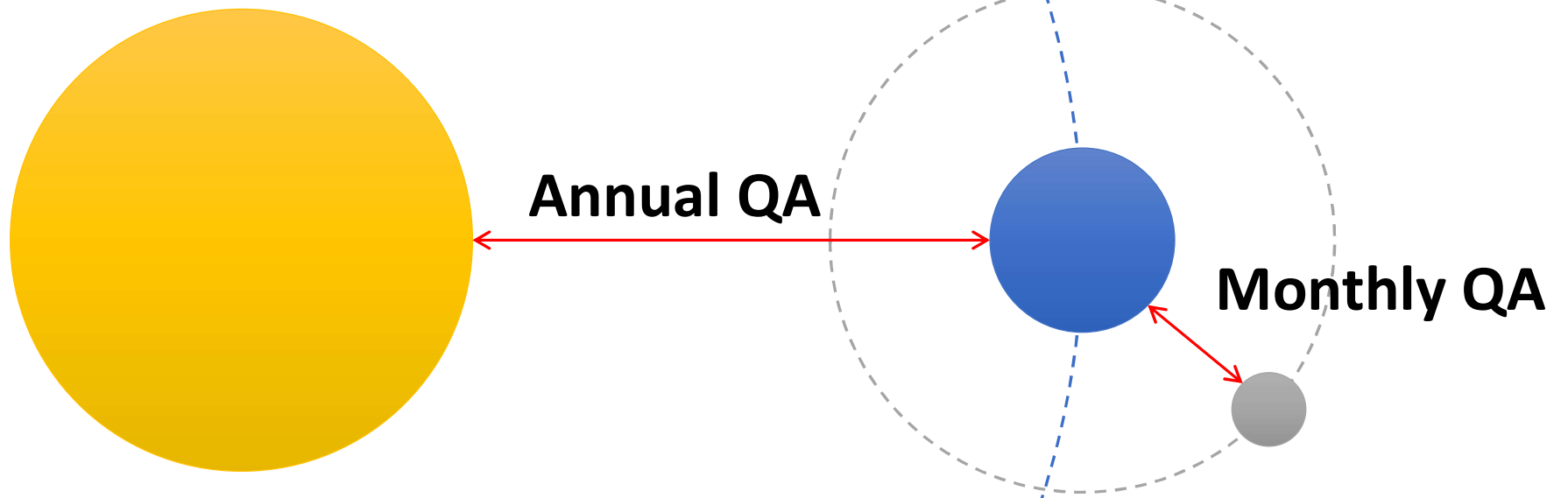
Quality Assurance



Quality Assurance



Quality Assurance Frequency

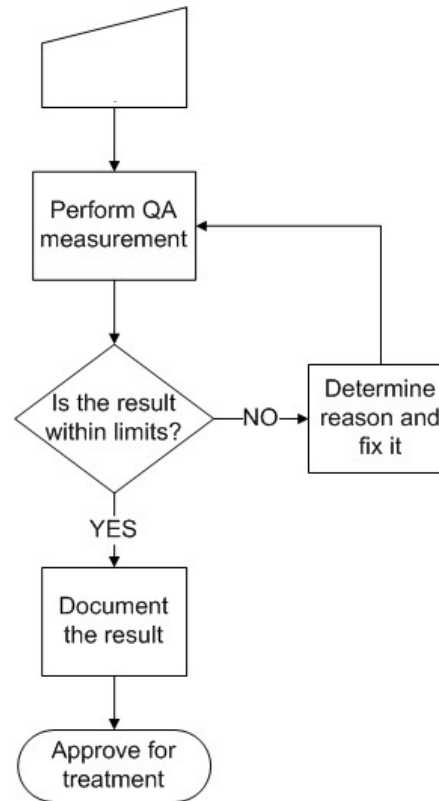
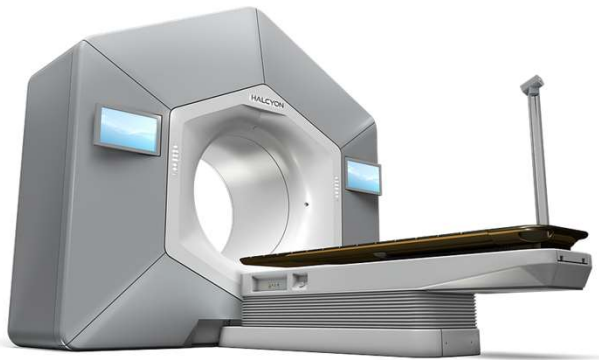


Daily Linac QA

- Beam output and energy
- Beam symmetry and flatness
- Light/radiation field coincidence
- MV/kV coincidence
- MLC operation
- Automated tools (e.g., MPC)



ed Ubiquitous QA Repository



continuously updated and
universally accessible

Decision Support

Total QA

https://tqa.imageowl.com/machines/new-qa/68/264#section-555

La Jolla Clinic → Del Mar (TB) → Monthly

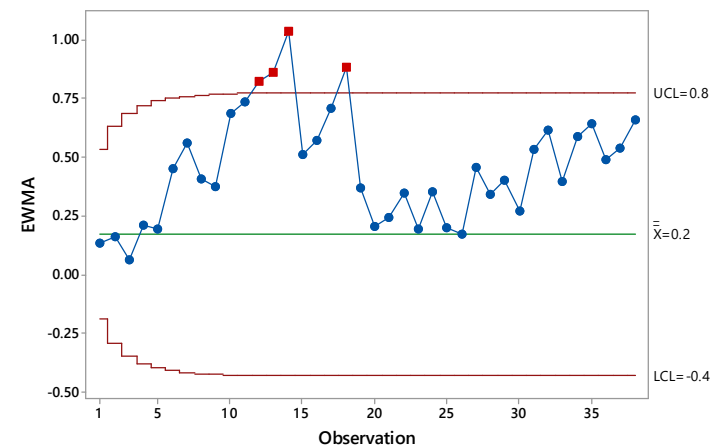
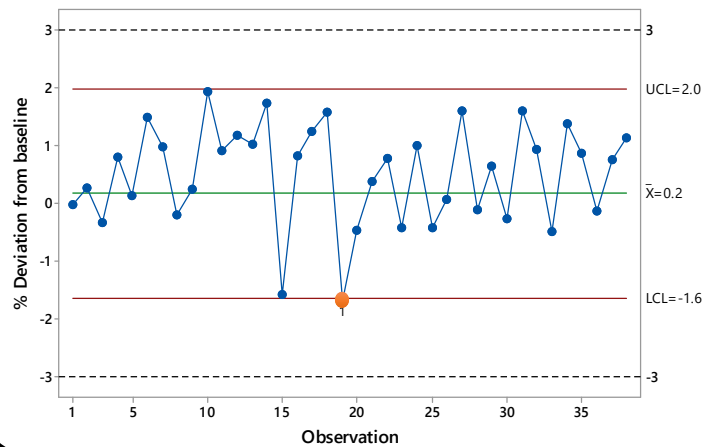
Save QA
Finalize QA

SECTIONS

- Mechanical (Monthly)
- 6D Couch
- Dosimetry (Monthly)

3. Dosimetry (Monthly)

SPC-Based Decision Support Tools



Solution Capture and Recall

August 2, 2013; 1:05 pm (KJP) ◀

- Output within tolerance but trending high. Observing for two more data points.

Add Solution

January 4, 2013; 5:51 pm (TRR) ▼

- Output within tolerance but something is out of control. Trending seems to be acceptable. Will check again next week.
- December 20, 2012; 6:30 am (MDT) – Within tolerance but out of control.
- December 20, 2012; 7:00 pm (TRR) – I tested the setup and I reproduced the output with an incorrect SSD for setup

Sign out

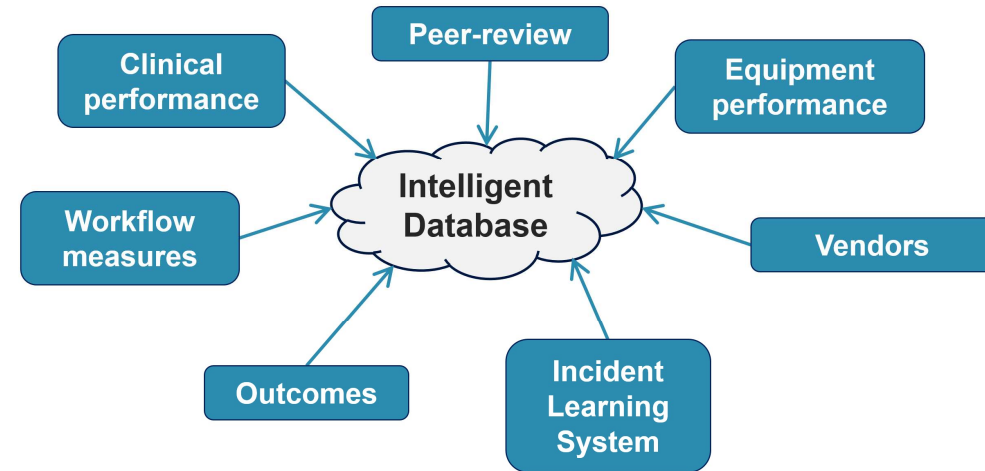
Better Leverage Existing Data

Equipment monitoring

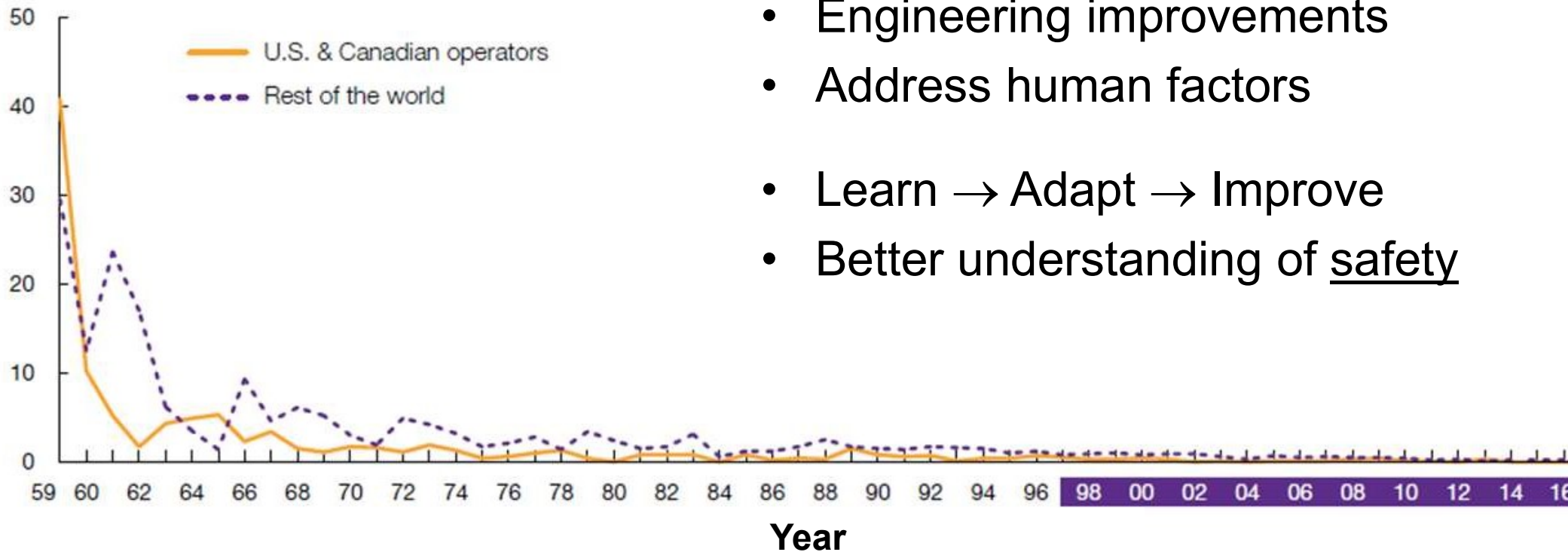
- Largely automated
- Limited routine physics checks

Better quality and safety

- Quality: Don't check everything... only what's needed
- Safety: Respond to process changes and near misses



line Industry

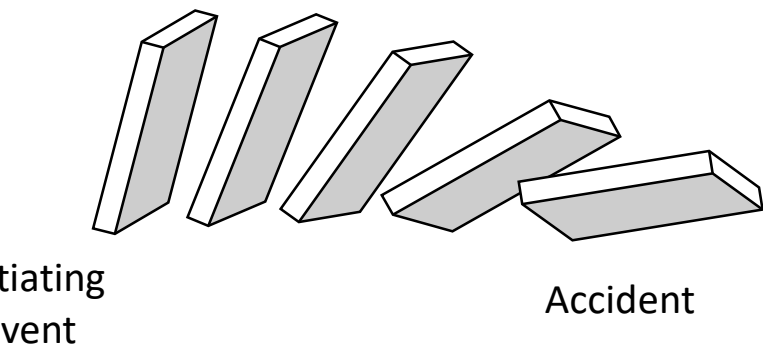


- Engineering improvements
- Address human factors
- Learn → Adapt → Improve
- Better understanding of safety

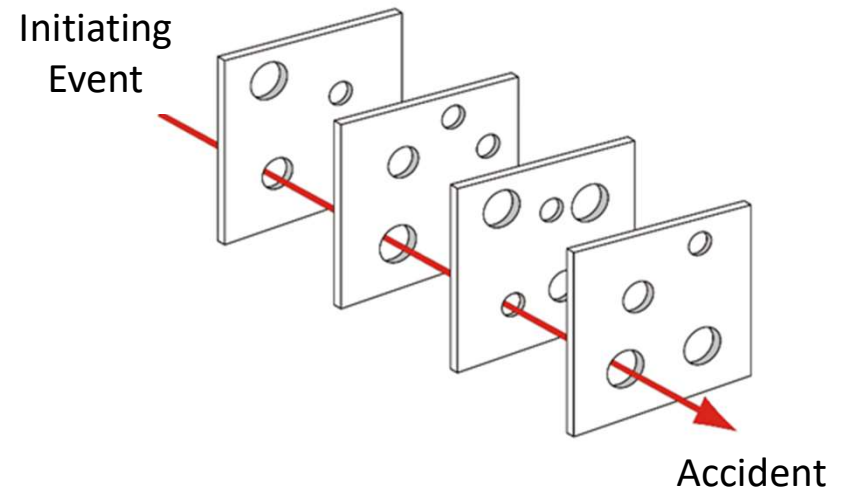
Boeing Statistical Summary of Commercial Jet Airplane Accidents | Worldwide Operations | 1959 – 2017

Accident Causality Models

Heinrich's Domino Model

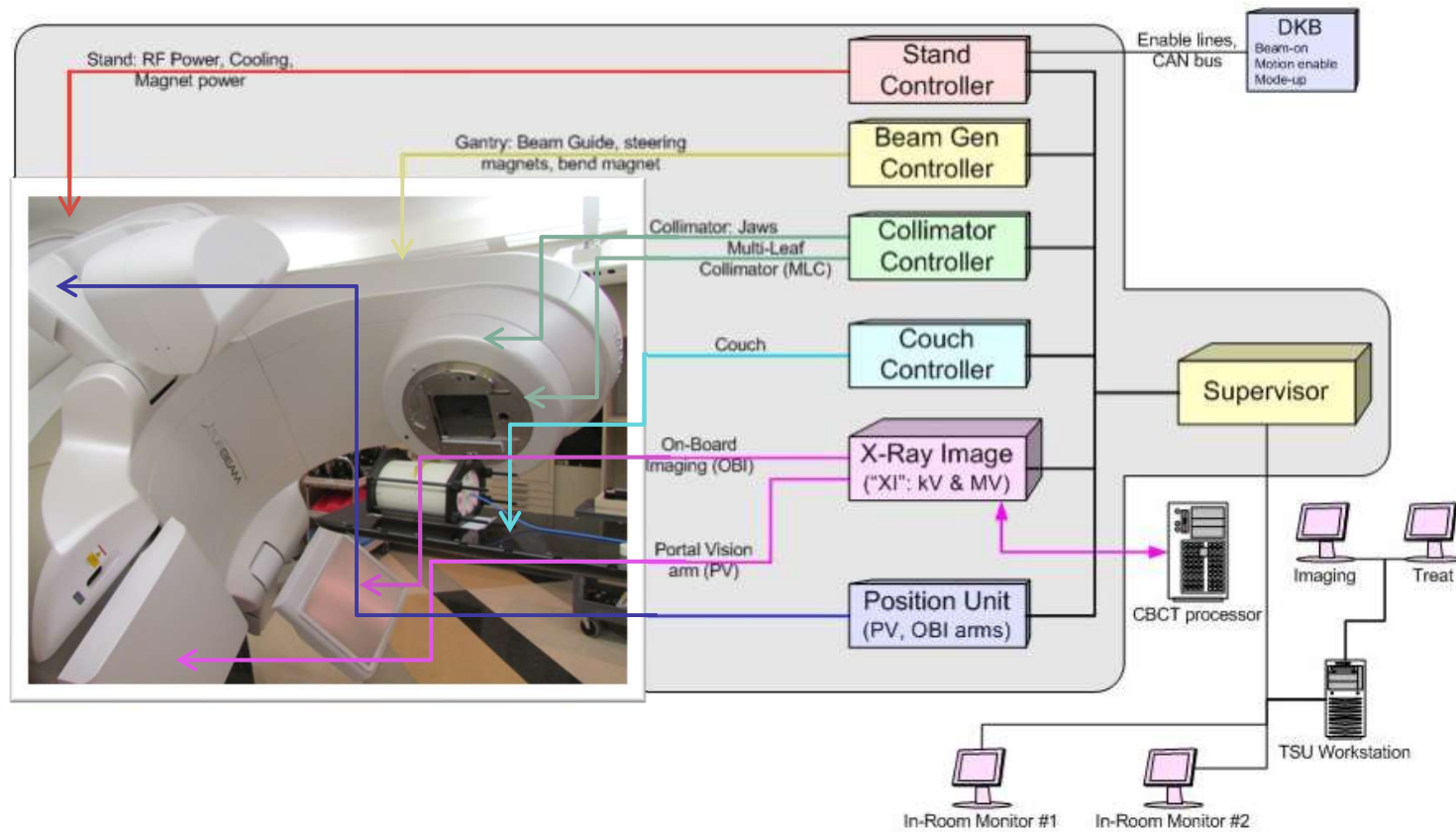


Reason's Swiss Cheese Model

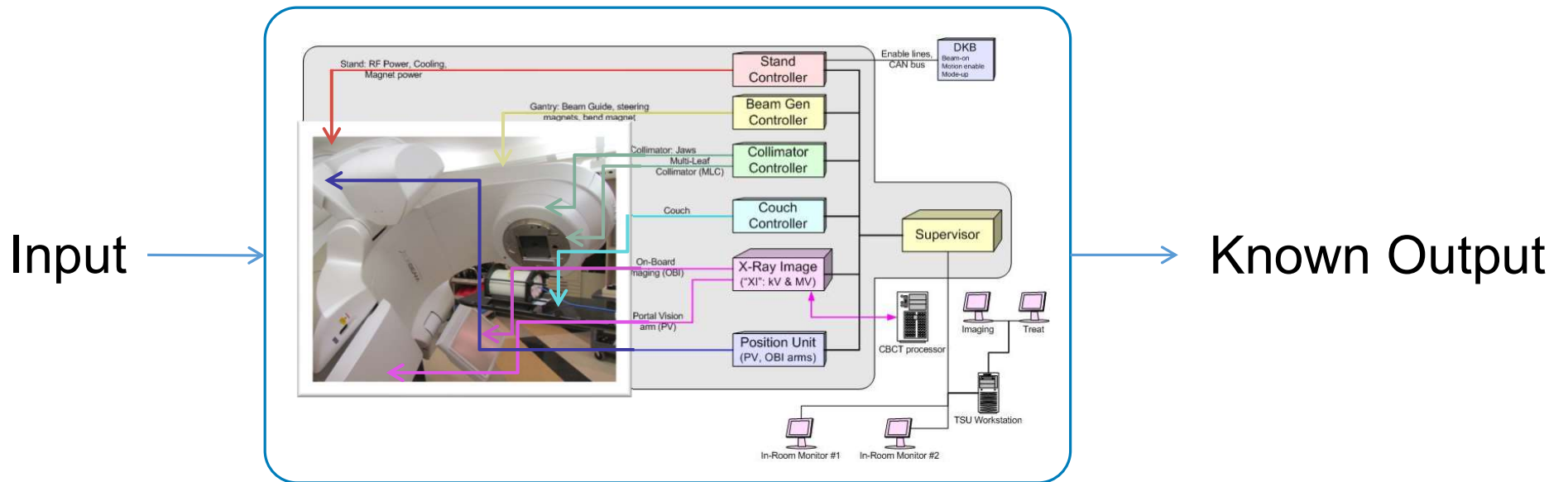


(Adapted from the work by Davidmack, CC BY-SA 3.0, via Wikimedia Commons)

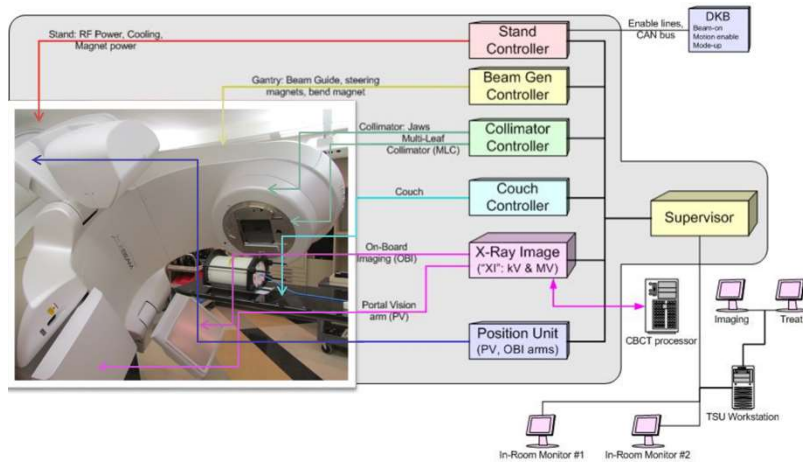
mplicated



mplicated System

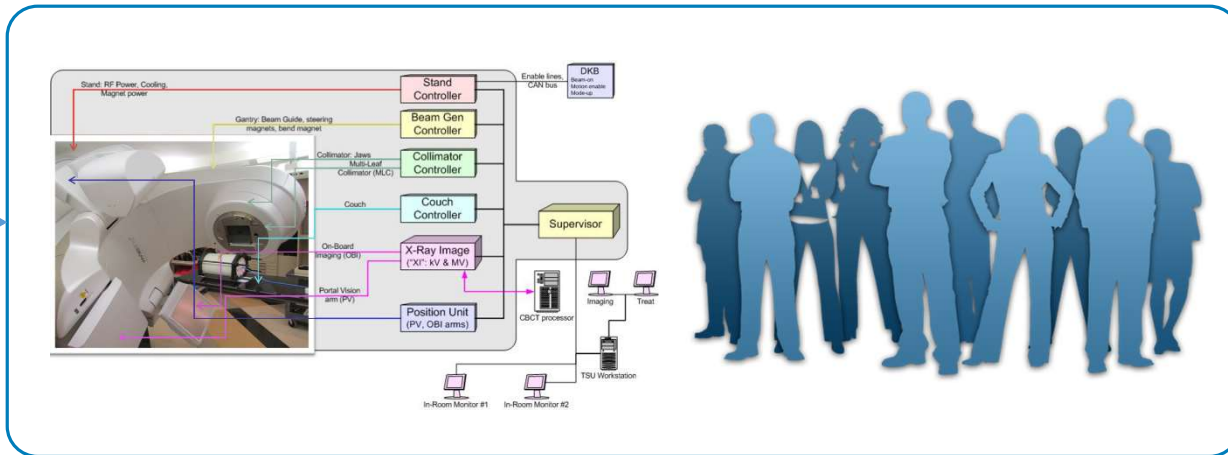


Complex

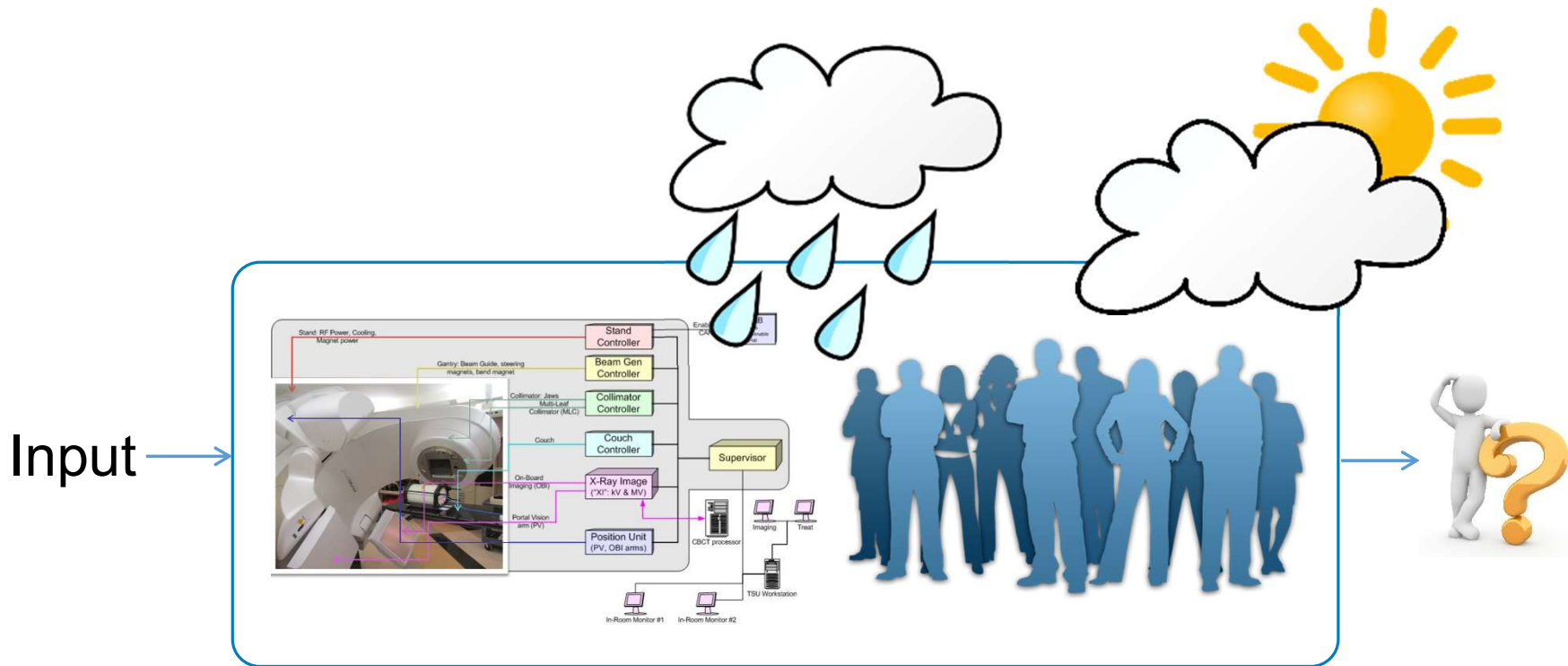


Complex System

Input

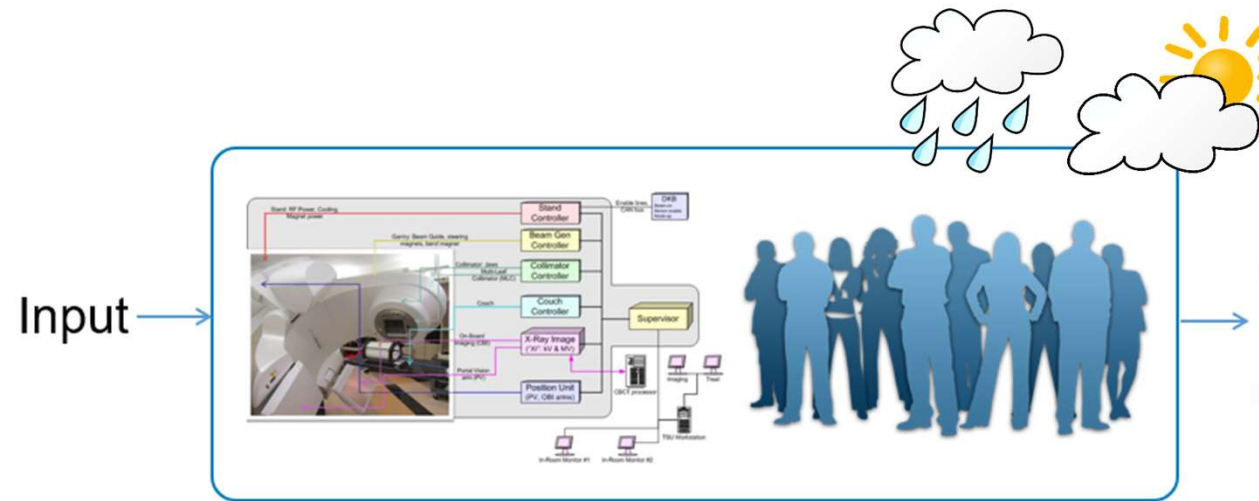


Complex System

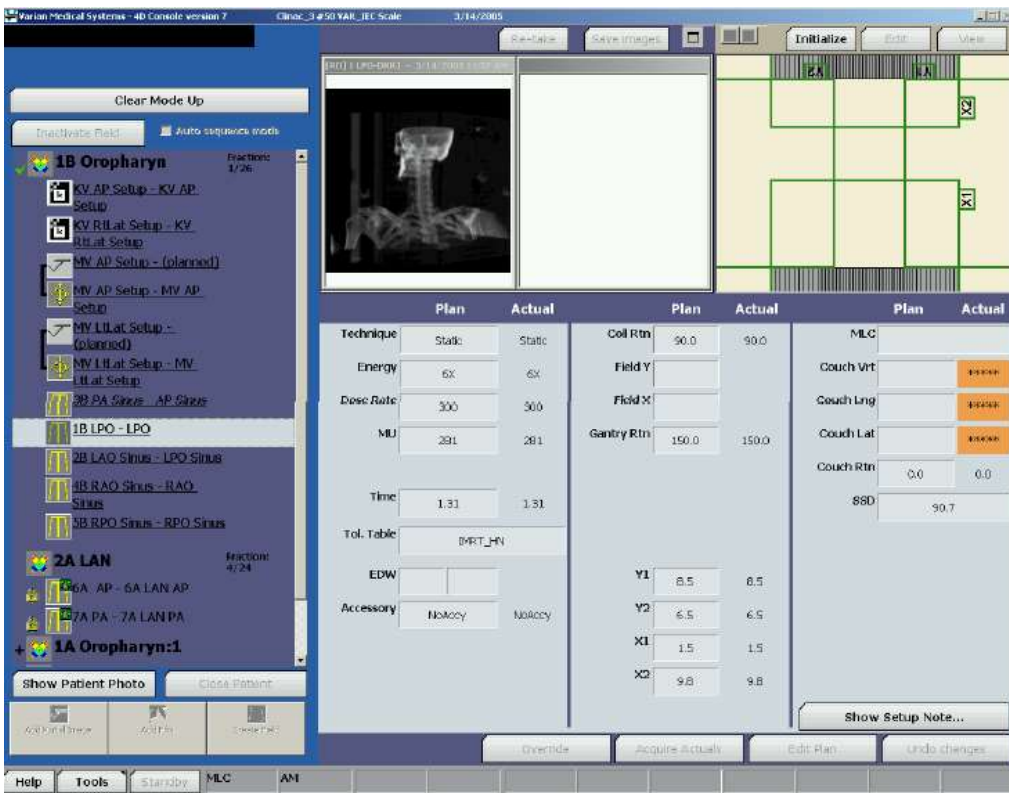


Characteristics of Complex Systems

- Robustness
- Emergent properties
- Subject to large events
- Unpredictable



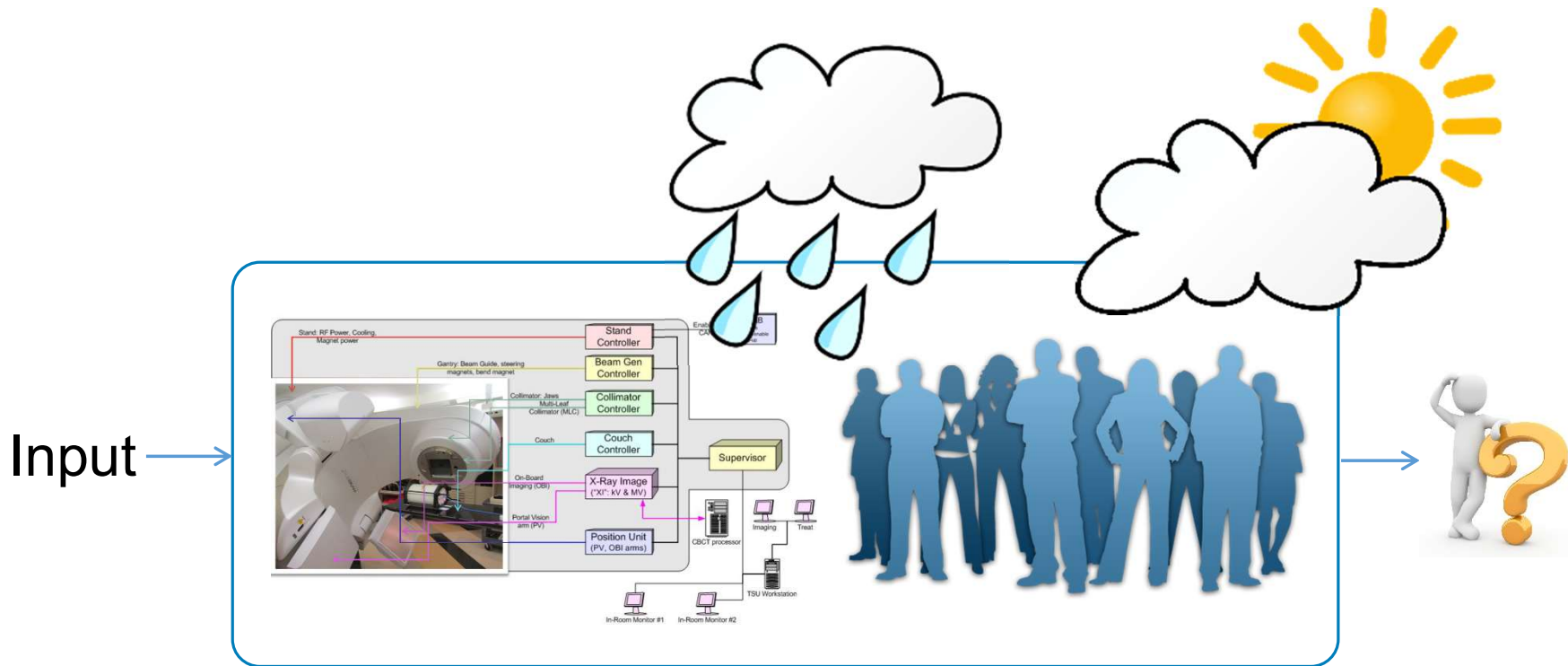
Unpredictable Large Event = Accident



Catastrophic IM
Treatment Error



Complex System



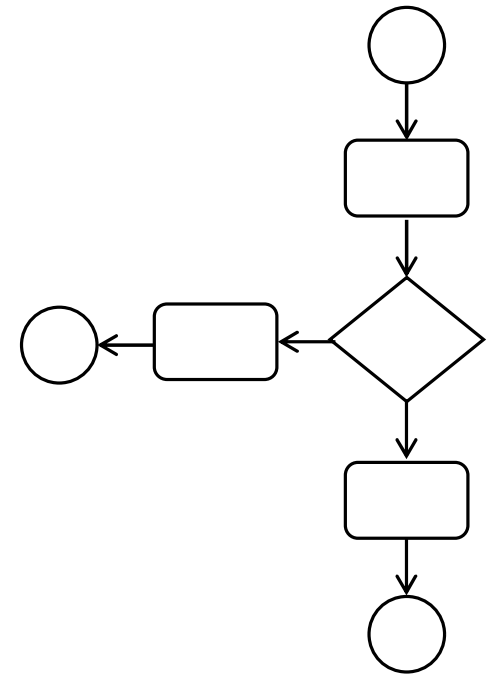
Probabilities of occurrence or detection don't apply!

Analyzing a Complex System



Need an approach that isn't overly rigid

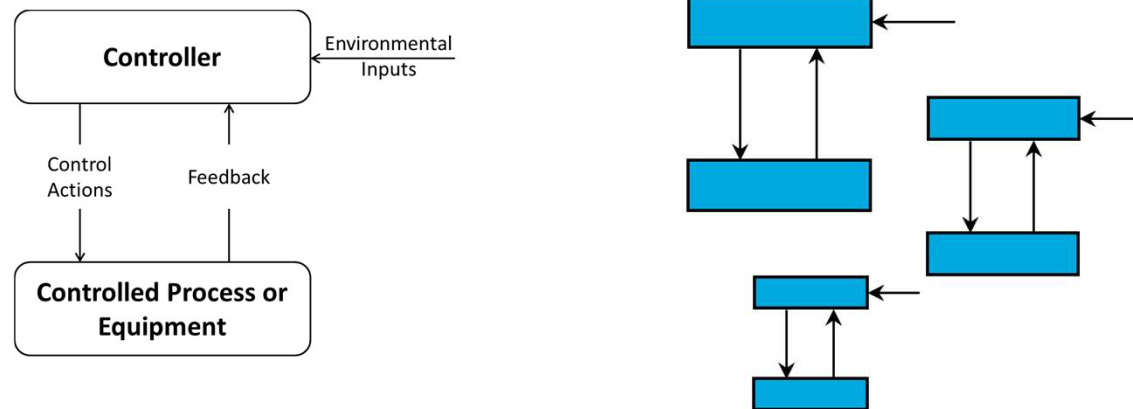
Look for unsafe conditions (hazards)



Other Accident Causality Model

Systems Theoretic Accident and Model Processes (STAMP)

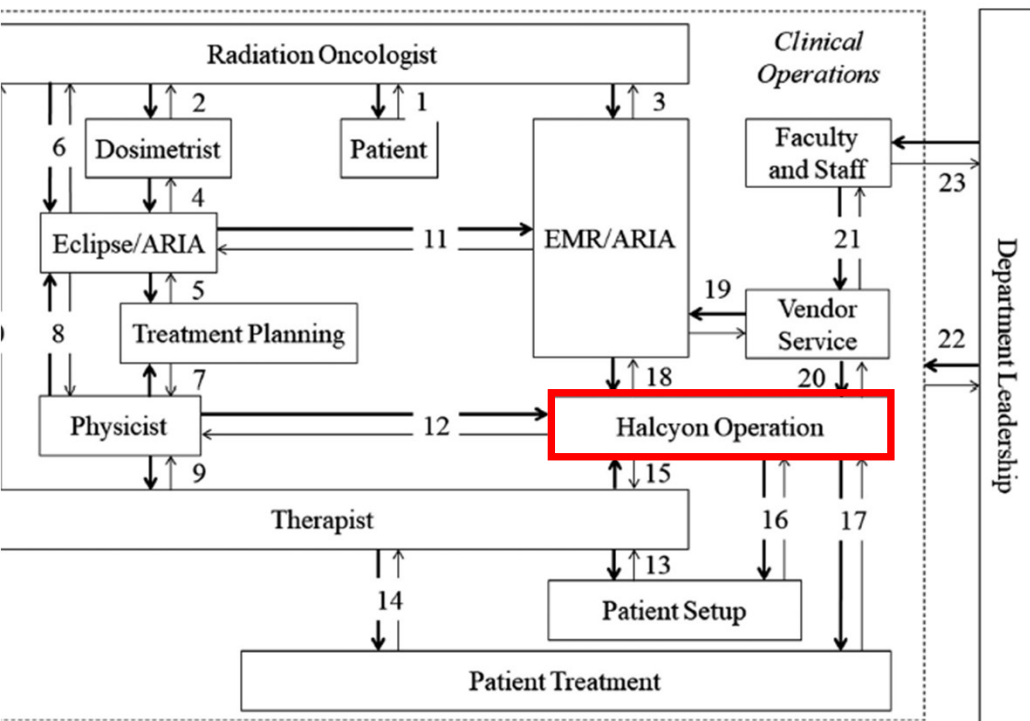
Safety is treated as a hierarchical dynamic control problem



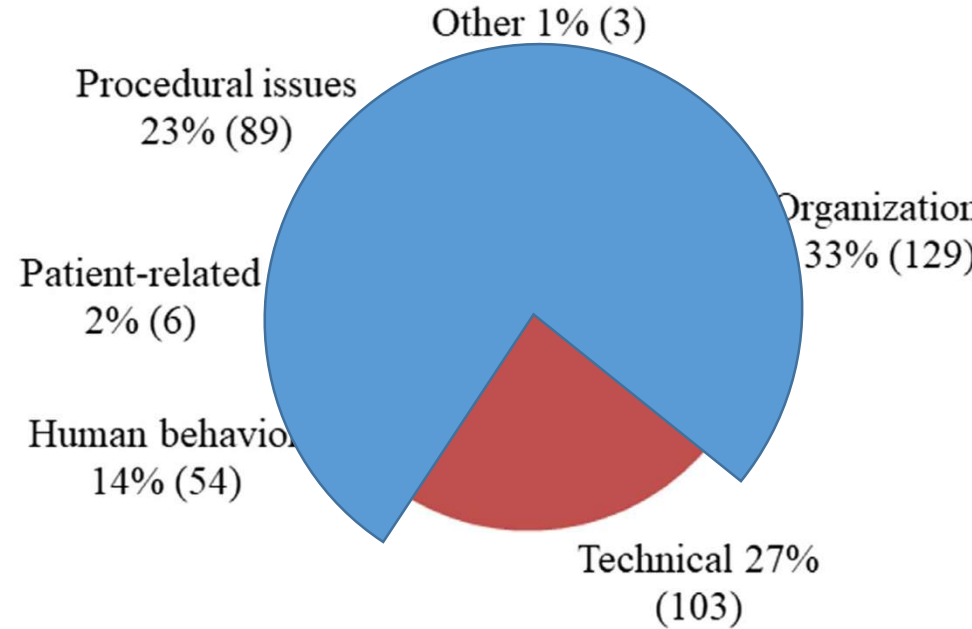
Leveson. Engineering a Safer World. MIT Press, 2011.

Halcyon System

System Modelling



- ~75% Procedural, Organizational, Human Behavior
- ~25% Equipment-related



Risk management

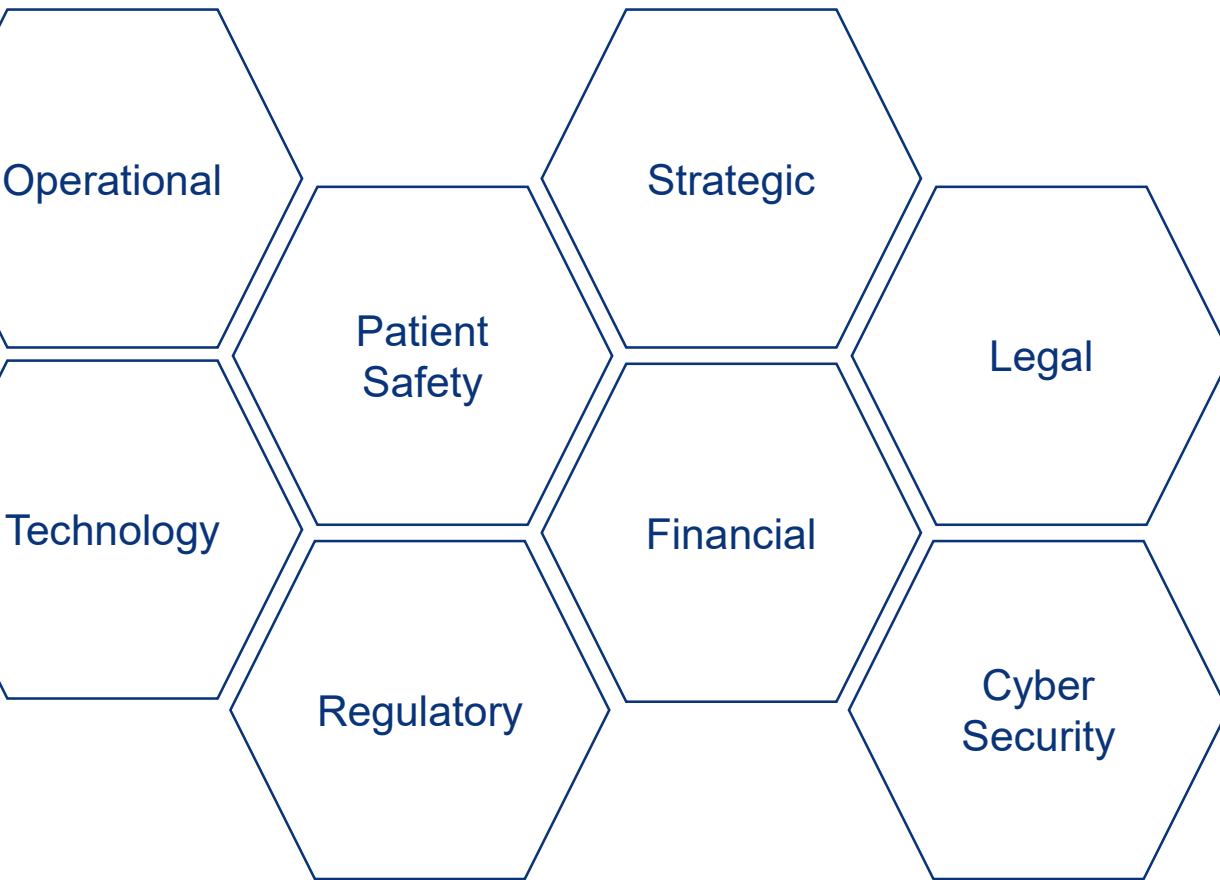
Pawlicki et al. Med Phys, 2019.

Managing Risk



Adapted from: What Is Risk Management in Healthcare? NEJM Catalyst, April 25, 2018.
[<https://catalyst.nejm.org/doi/full/10.1056/CAT.18.0197>]

Managing Risk

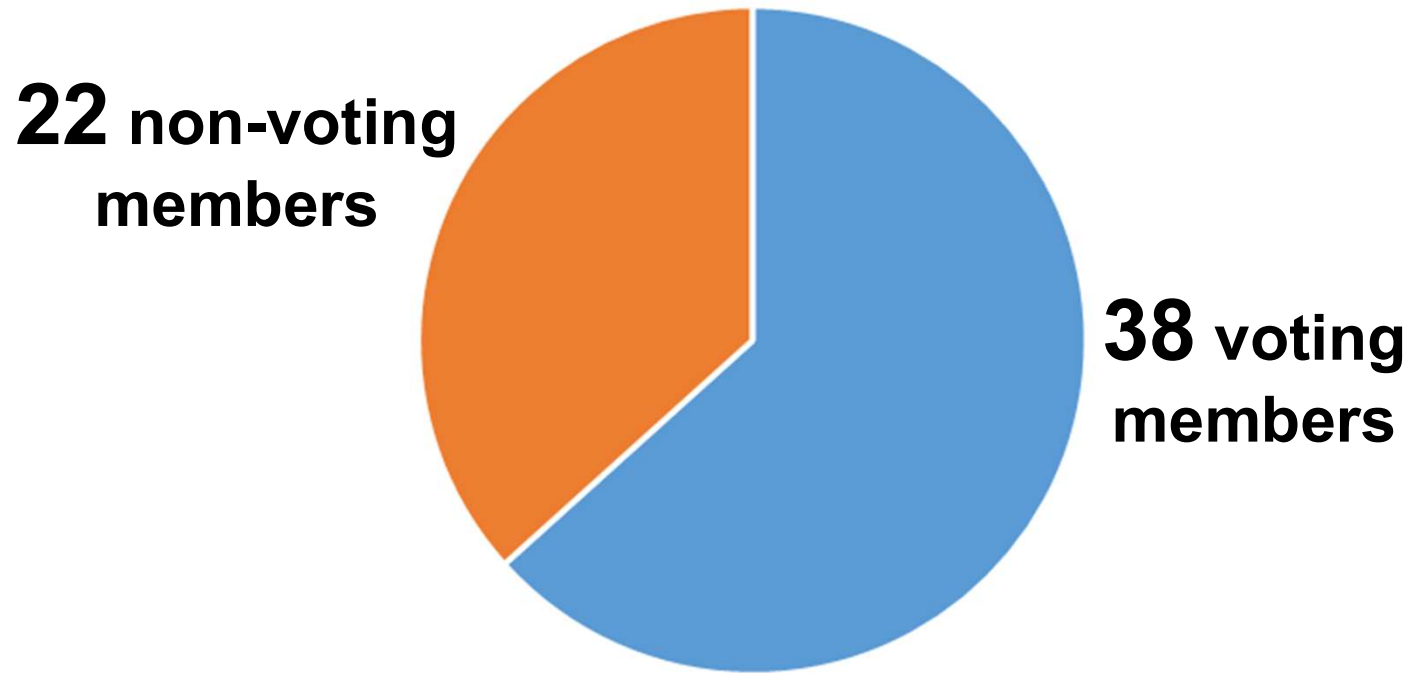


How does the AAP manage risk?

Adapted from: What Is Risk Management in Healthcare? NEJM Catalyst, April 25, 2018.
[<https://catalyst.nejm.org/doi/full/10.1056/CAT.18.0197>]

PM Board of Directors

60 total member of the Board



Responsibilities of the Board



PM Executive Committee (EXCOM)

2023 AAPM Executive Committee



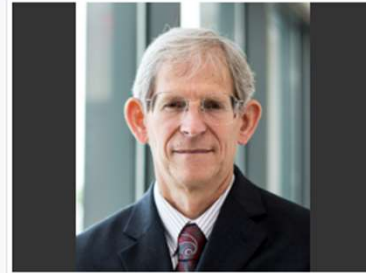
Ehsan Samei, PhD, FAAPM
President

Duke University Health System



Todd Pawlicki, PhD, FAAPM
President-Elect

UC San Diego



J. Daniel Bourland, PhD,
FAAPM

Chair of the Board

Wake Forest University



Jennifer Lynn Johnson, PhD,
FAAPM

Secretary

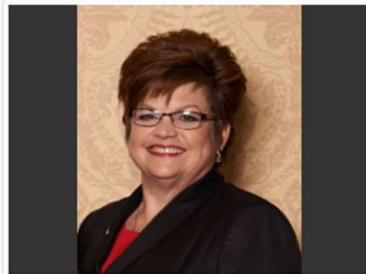
Potentia Partners



Samuel G. Armato III, PhD,
FAAPM

Treasurer

The University of Chicago



Angela R. Keyser

AAPM Executive Director

PM Operations

Administrative Council

- Awards and Honors
- Communication Coordination
- Corporate Relations
- Government
- Meeting Coordination
- Regional Organization

Education Council

- Medical Physicists as Educators
- Continuing Professional Development
- Education and Training of Medical Physicists
- Education of Allied Health Professionals
- Education of Physicians
- Public Education

Professional Council

- Clinical Practice
- EDI Committee
- Ethics
- Medical Physics 3.0
- Leadership Academy
- Professional Services

Science Council

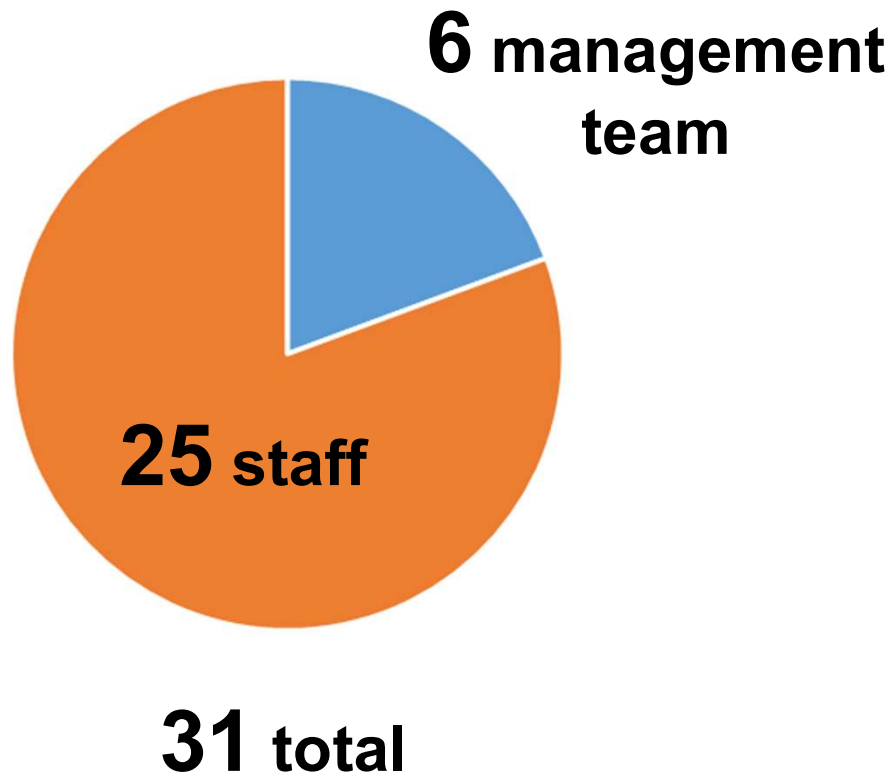
- Data Sciences
- Imaging Physics
- Therapy Physics
- Research
- Mentorship Program
- WG on IHE-RO

International Council

- Global Clinical Education and Training
- Global Data and Information Exchange
- Global Needs Assessment

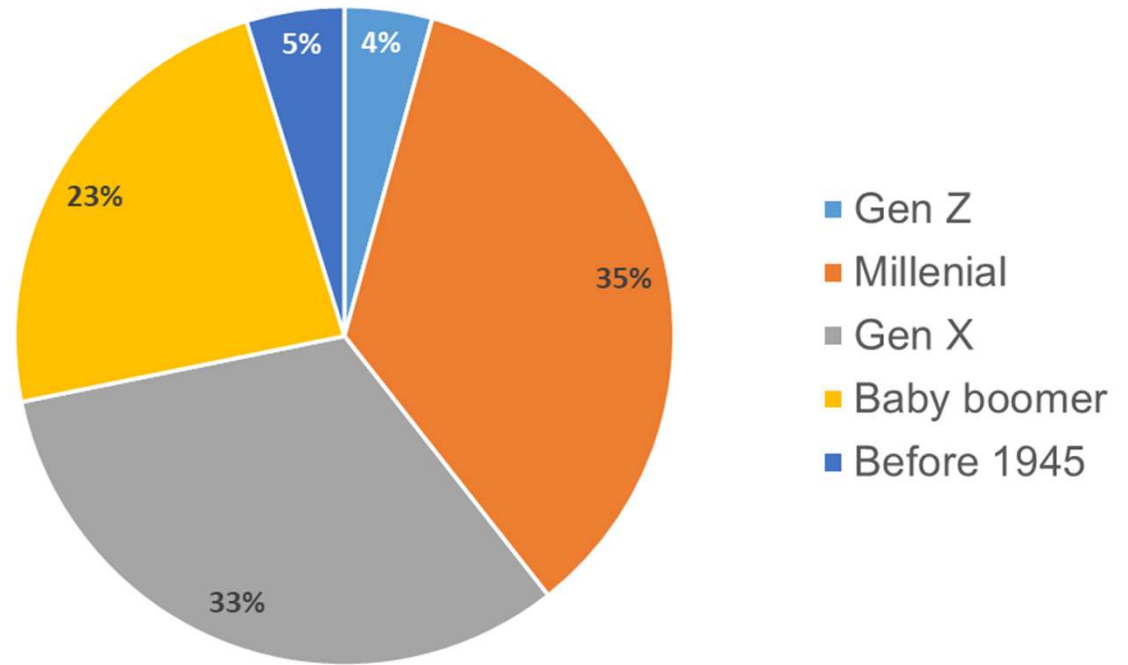
Councils do not make strategic decisions for the AAPM.

PM Staff

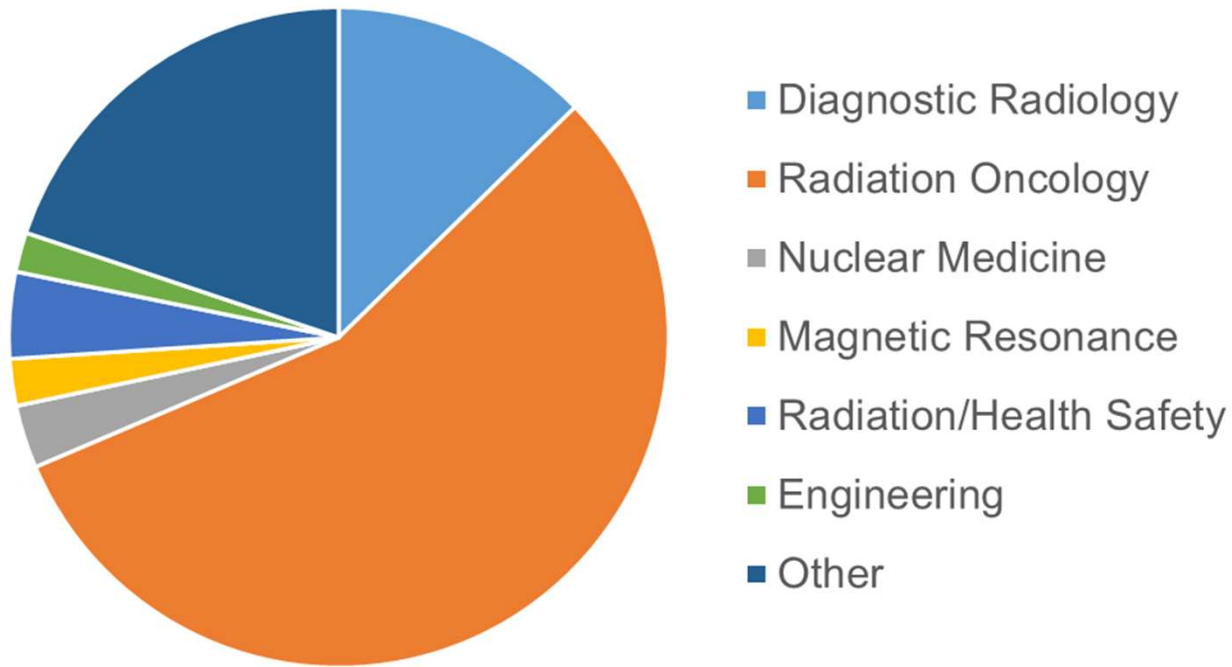


Membership by Category

Count	Membership Category
124	Associate
478	Corresponding
977	Emeritus
27	Emeritus Associate
6161	Full
32	Honorary
233	International Affiliate
199	Junior
31	Professional Affiliate
392	Resident
439	Society of Physics Student
767	Student
9860	Total



Membership by Profession



Medical AAPM Annual Financials

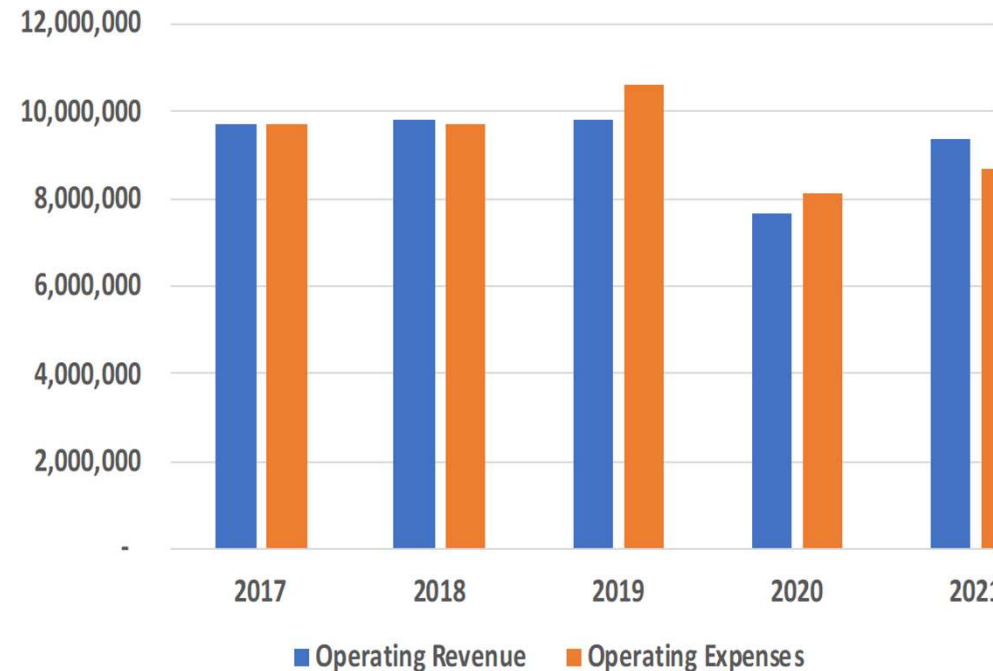
Revenue: ~\$9-10M

- Annual Meeting
- Journals
- Membership Dues
- Placement Service

Approve budget deficit: ~\$1.5M

Year-end Surplus: ~\$0.5M

Five Year Trend - Operating Revenue and Expenses



Year Strategic Focus

Coordinating, integrating, and communicating AAPM activities and initiatives from development to implementation

Ad Hoc Advisory Committee on Administrative Proficiency (AHAP)

- [bookmark this page](#) (bookmarks show under "My AAPM" in the menu to left)

[Committee Website](#) | [Directory: Committee](#) | [Membership](#)

Email You may send email to this group now using [gmail](#) or [outlook](#).
- or -
You may save the address 2023.AHAP@aapm.org
to your local address book. This alias updates hourly from the AAPM Directory.

Charge Committee and Task Group work has been and remains a primary mechanism by which AAPM advances its mission and shapes the discipline. However, there is significant growth in the number of AAPM committees (not in pace with membership growth), duplication of effort, missed opportunity for coordination and harmonization, inefficient communications within and across groups, and inefficient utilization of HQ staff in support of the AAPM groups. Thus, there is a significant opportunity to revisit the administrative, internal communication, and project management processes at AAPM.

The overall objective of this AH is 1) to advise the Board regarding how the AAPM administration in general can be structured and organized for better success, and 2) to contemplate and then advise concrete actions to the BOD regarding how AAPM structure and HQ support can be refined to better serve the AAPM mission.

Chair



Emilie Soisson
Committee Chair

Year Strategic Focus

Expanding our scope and presence in medicine by identifying future directions in the science and practice of medical physics

Ad Hoc Advisory Committee to Develop Advocacy Materials for Administrators on the Business Case for Medical Physics in Clinical Departments (AHBCA)

- [bookmark this page](#) (bookmarks show under "My AAPM" in the menu to left)

No Website on file. | **Directory:** [Committee](#) | [Membership](#)

Email You may send email to this group now using [gmail](#) or [outlook](#).

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You may save the address 2023.AHBCA@aapm.org to your local address book. This alias updates hourly from the AAPM Directory.

Charge To consider the best mechanism for producing advocacy material aimed at administrators – specifically to include a potential “business case” for medical physics – and recommend funding needed to complete this task. In particular, the committee should:

- Consider the best type of material to make the case to administrators about the value and cost effectiveness of medical physicists

Chair



Jennifer Lynn Johnson
Committee Chair

band in existing areas

Contribute more directly to patient care

- Independent professional relationship with the patient

From: [REDACTED]
Sent: Thursday, September 8, 2022 11:24 AM
To: tfatwood@ucsd.edu <tfatwood@ucsd.edu>
Subject: SAVE THE DATE! Sept 29 6:30 PM Paella Dinner

Hi Dr. Atwood,

Last year my husband and I met with you in advance of my cancer treatment for tongue cancer. (Dr. [REDACTED] is my radiation oncologist.) I was curious about how the plan would take into consideration prior radiation I'd had due to breast cancer.

We so thoroughly enjoyed the time you spent with us and the explanations you gave us about the treatment planning process. Your passion about what you do was truly memorable!

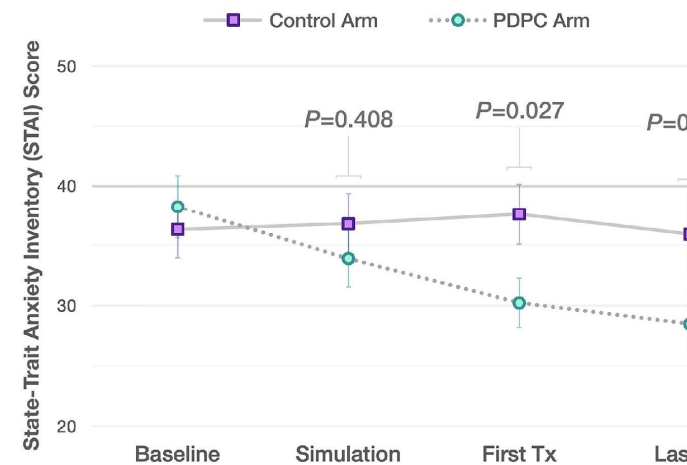
It's almost a year since my treatment ended (Oct 18, 2021) and my husband and I want to thank my care providers. You are certainly a key person on my team.

Please join us for dinner and feel free to bring your spouse. We'd love to see you again.

PS: A non-seafood paella option will also be made by Chef Strauss.



Patient Anxiety



Atwood *et al.* IJROBP, 2023.

band in New Areas

Workgroup on Optically Guided Intervention (WGFGI)

bookmark this page (bookmarks show under "My AAPM" in the menu to left)

Committee Website | **Directory:** [Committee](#) | [Membership](#)

Email You may send email to this group now using [gmail](#) or [outlook](#).
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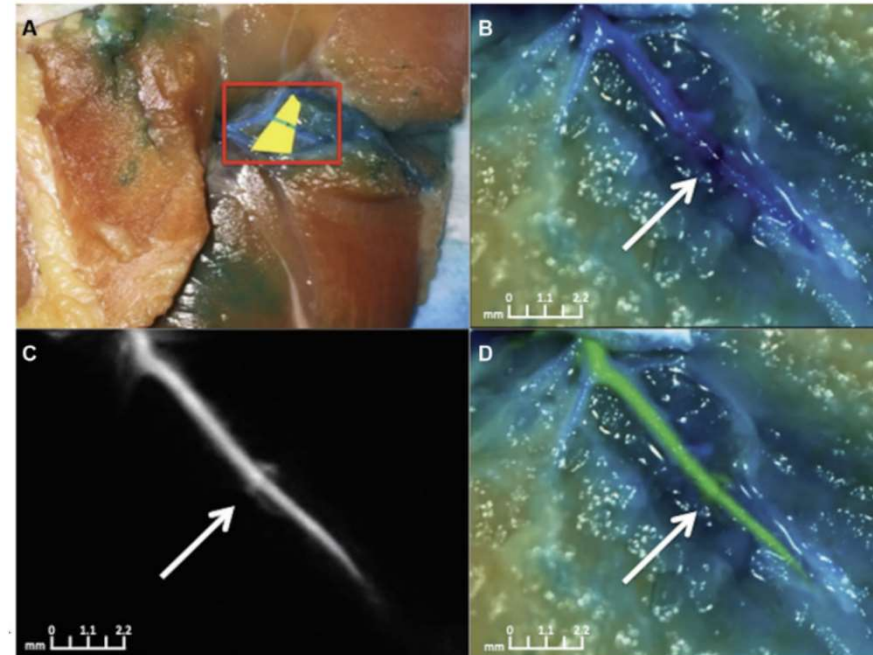
Charge Optically guided interventional (OGI) technologies offer imaging and therapeutic options on the molecular level with high specificity, providing complementary information to other theragnostic paradigms and synergistic opportunities with radiation therapy (RT). OGI procedures on commercialized clinical systems are rapidly expanding, yet few professional guidelines exist.

With specific technological focuses on fluorescence imaging guided surgery, optical coherence tomography, photo-acoustic imaging, optical surface imaging guidance, photodynamic therapy and synergies with RT, WGOGI is formed to

1. advocate the development and adoption of OGI technologies via partnership with physicians, policymakers, and industry,
2. make recommendations from a medical physics perspective on professional guidelines of calibration, quality assurance, and standardization in system operation,
3. ultimately optimize patient care with safe and precise interventional procedures.



<https://www.onlume.com/>



AAPM Journals need you!



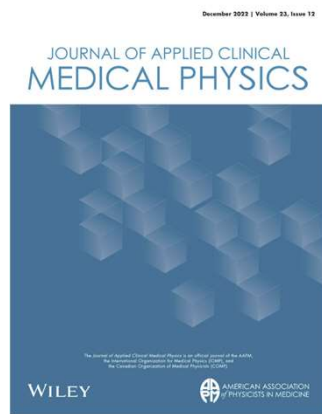
Journal of Applied Clinical Medical Physics

clinical imaging physics

medical physics education

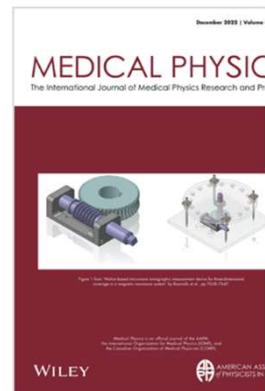
clinical radiation oncology physics

radiation measurements



Medical Physics Journal

- dosimetry
- treatment delivery
- novel imaging
- image reconstruction
- therapy/imaging data sets
- instrumentation development



How to volunteer as a referee

Create a peer review account

- For Medical Physics: <https://medphys.msubmit.net>
- For JACMP: <https://jacmp.msubmit.net>

Add your affiliation

Add 5-8 taxonomy terms for your area of expertise

Read referee guidelines to complete a thorough review

Receive CAMPEP credits for your review!

ank you!

Questions, Comments, Concerns, Suggestions

