

A.3. Healthcare & biomedical systems

Healthcare & biomedical systems. Systems Engineering and Systems Thinking have much to offer to enhance healthcare outcomes, though these practices are not widely adopted. Healthcare systems are often complex, distributed, and safety critical. Contributions to this stream are invited to share case studies or contributions where a systems approach has or may improve outcomes.

Lead: Andrew Madry, Grace Kennedy

Domains: Healthcare Systems

Submissions Summary:

1. Gene Therapy in Developing Countries (Full Paper)
2. Integrating Systems Engineering Principles into Healthcare: Enhancing Efficiency, Safety, and Patient Outcomes (Panels and Workshops)
3. Cyber Risks for Hospitals (Paperless Presentations)
4. SE perspective on the effect of risk management on the performance of imaging systems (Full Paper)

21312 Gene Therapy in Developing Countries

Joseph Aliwali 1, Individual, Yukon, OKLAHOMA, United States

Keywords: [Gene therapy Implementation](#)

Type: Full Paper

Stream submitted: A.3. Healthcare & biomedical systems

Gene therapy is an emerging medical approach to providing a cure for inheritable or genetic diseases due to faulty genes and other infectious diseases. This paper seeks to analyze the prevalence of these medical conditions in low- and middle-income countries and investigate the factors stifling the access of this potentially lifesaving treatment. The approach will be to define the system framework and interactions within which gene therapy can be applied with the objective of proposing viable avenues of implementation.

20947 Integrating Systems Engineering Principles into Healthcare: Enhancing Efficiency, Safety, and Patient Outcomes

Bohdan Oppenheim 1, Jawahar Bhalla 2, Andrew Madry 3, Healthcare Systems Engineering MS Program at LMU, Los Angeles, California, USA, JB Engineering Systems, Sydney, NSW, Australia, Madry Technologies Pty Ltd, Galston, NEW SOUTH WALES, Australia

Keywords: healthcare, lean

Type: Panels and Workshops

Stream submitted: A.3. Healthcare & biomedical systems

This panel will explore the transformative potential of applying systems engineering principles to the healthcare sector. As healthcare continues to face complex challenges, including resource constraints, rising costs, and the need for digital transformation, systems engineering offers a framework to improve efficiency, enhance patient safety, and optimize outcomes. Our discussion will feature leading experts from both fields who will examine case studies demonstrating successful integrations and discuss methodologies that can be adapted for various healthcare settings. Attendees will gain insights into leveraging systems engineering tools such as process optimization, risk management, and technology integration to address pressing healthcare issues, paving the way for a more resilient and effective healthcare system.

21257 Cyber Risks for Hospitals

Rob Relf 1, Alive Information, South Melbourne, VIC, Australia

Keywords:

Type: Paperless Presentations

Stream submitted: C.8. Technical Leadership in a Digital Future

Cyber Risks From an engineers POV. A key step of the risk management life cycle is to determine the appropriate response to each risk. The goal of effective risk management is to identify ways to keep risk aligned with the risk appetite or tolerance in as cost-effective a way as possible. Engineers need to take an overall risk assessment of the project involved with IT, only focused on the software system. This outline is to look at all the inputs, the people involved and their responsibilities and how the risk concept can be applied, with a focus on hospitals. An outline of progressive steps will be given. A key item is, we are only focused on industrial projects and not consumer product developments. Asset managers run sophisticated data systems on their assets. In the medical industry, the co-ordination of cyber risks is going to be a good challenge in the future. As risk management processes are identified and improved, including specific strategies for responding to risks in the asset register, it will be important to ensure descriptions of those responsible, accountable, and informed about each activity therein and if Privileged Access needs to be considered. IT have a Common Vulnerability Scoring System for screening networks and examines the severity of vector strings. This standard is put forward by NIST. One of the items being brought to the table is AI and Machine Learning. This is no longer an IT challenge but a whole-of-business challenge. For Industry 4.0 era, selecting the data needed from multiple sources will be one of the key challenges for quality control and quantifiable risk management. We need leadership from system engineers. Fortinet in Australia, with two universities and industry bodies is developing a pilot project for industry review. Balancing Your Healthcare Cybersecurity & Compliance Efforts

21269 SE perspective on the effect of risk management on the performance of imaging systems

Sharad Rayguru 1, Philips Healthcare India, Pune, MAHARASHTRA, India

Keywords: Medical electrical equipment, fluoroscopy, Image Quality

Type: Full Paper

Stream submitted: D. Other

The development of electrical medical devices requires compliance with a host of regulations and standards to help ensure their Risk management, safety, and effectiveness. Because patient and user safety are paramount in medical devices, we focused on risk-based methodologies to address safety. This paper discusses risk management methods to reach low residual risk levels using risk management matrices. The risk management process starts with the conception and follows each step of the product design phases up to and including the product's end of life. This paper will offer some systems implementable suggestions to address various safety and quality attributes to obtain the desired image quality for interventional therapies.
