SIR Medical Student Council
Biodesign and Innovation Committee

2026-2027 Biodesign Competition

Table of Contents

Introduction and Mission	**1**
Overview	**2**
Expectations	**3**
Evaluation Criteria	**5**
Resources for Teams	**6**
Tips for Success	**7**
Frequently Asked Questions	**7**
Timeline	**7**
Intellectual Property	**9**
Example Abstracts	**10**

Introduction and Mission

Interventional radiology (IR) was born in the 1960's from paradigm-changing, medical advancements achieved by radiologists, most notably Charles Dotter. Throughout the history of IR, members of the field have continually pushed the boundaries of modern medicine by utilizing technological advancements to augment patient care. Today as the field continues to grow, the innovative spirit amongst IR physicians remains as alive as ever.

Common misconceptions about biodesign are that it requires special creativity, formal engineering training, or some great inspiration. In actuality, iterative practice of a carefully considered approach to the design process is key to creating meaningful inventions in medicine. The Medical Student Council's (MSC) Biodesign and Innovation Committee (BDIC) believes that early trainee exposure to and practice of biodesign will help students cultivate the foundational mindset and skills for successful innovation and inventorship in IR or other medical specialties.

In biodesign, one of the most critical steps to creating a well-engineered product is comprehensive understanding of the problem. Lack of a comprehensive understanding of the clinical and extra-clinical factors, such as the needs of patients, physicians, hospitals, insurance companies and other key stakeholders, will not allow for the successful fulfillment of various proponents of the main issue.

To become physicians, trainees spend time studying the science behind disease processes and practicing diagnosis, treatment, and management. They devote many years of their lives to figuring out how to best care for patients and in return, they see the results of their interventions on patients' lives. Through medical students' training and practice, they develop an intimate understanding of the challenges and nuances faced by their patients and peers. They become experts in the clinical setting; thus, they are adept at tackling medical problems. With mindful practice of biodesign, trainees can clearly delineate the functional needs of the problems they encounter and collaborate with other professionals to create large scale solutions.

Innovation is deeply rooted in IR and remains a salient characteristic of the field. The Society of Interventional Radiology (SIR) MSC BDIC believes in teaching biodesign and cultivating the biodesign spirit within aspiring IR students. With this in mind, we have created the BDIC Biodesign Competition as an opportunity for medical students to learn the fundamentals of biodesign and apply them to real-world problems with the mentorship of IR physicians.

Overview

SIR MSC BDIC will host the Biodesign Competition, wherein students will be challenged to solve problems faced in IR in a collaborative setting with peers and IR mentors. Multidisciplinary teams consisting of medical students, undergraduate, and/or graduate students will participate in a series of events across multiple months. Participants will work within their teams and collaborate with IR mentors either at their local institution or elsewhere. At the end of the competition, teams will submit proposals to BDIC and present their work to a biodesign judge panel for evaluation and feedback. Selected teams are invited to present during the Biodesign Competition webinar and the top four teams will be selected to present at the SIR conference in March 2027.

In preparation for the competition events, each team is expected to establish a relationship with an IR mentor. If your institution does not have an IR department or you cannot find a mentor, the BDIC can help you find a mentor.

The competition begins in the Fall with the announcement of the theme. Teams will have access to educational content produced by the BDIC, including the Biodesign Webinar Series, as well as check-in sessions with mentors throughout the process. At the culmination of the competition, teams will submit a solution proposal outlining their design process and generated solution along with a graphical abstract that will be made available to the public. The proposal document will be shared with judges, and the top four teams will be chosen to present their work live at the SIR conference and receive feedback from a panel of judges.

Teams will be able to use feedback from the panel to continue improving upon their projects if they so choose. If students are interested in further developing their solution concepts, the BDIC can connect teams with possible industry mentors.

Expectations

1. Forming Teams
    a. When forming teams, BDIC encourages medical students and/or undergraduate and graduate students to work together and identify an IR attending mentor early on.
        i. Forming multidisciplinary teams and finding students in other fields, such as engineering or business and design may help your team analyze and brainstorm in different ways.
        ii. Teams are required to submit a roster at the beginning of the competition, but we understand that there is fluidity and team members may change.
        iii. If you would like to connect with potential team members at different institutions, you may do so on the Biodesign Slack Channel (see Point 3 below).
    b. Each team should select a team leader that will be the primary point of contact between their team and the BDIC.
    c. Team leaders are encouraged to touch base with the BDIC frequently during the course of the competition for progress updates and to address any questions over phone or video calls. Please feel free to contact the BDIC through our email: sir.msc.biodesign@gmail.com. Alternatively, you may reach out on the Biodesign Slack Channel (see Point 3 below).
2. Working with your IR mentor
    a. Teams are encouraged to work closely with an IR mentor. The clinical experience a practicing IR possesses is a great asset to your team and will help in developing a comprehensive understanding of the problem that you will be trying to solve.
    b. BDIC has a diverse group of mentors available upon request.
    c. If you have not done an IR rotation, try and shadow your IR mentor or other physicians in the IR department. This will be an invaluable experience to learn not only about the competition theme and IR, but also to further assess your interest in the field.
3. Biodesign Slack Channel
    a. Each member is expected to join the Biodesign and Innovations Committee's Slack ("SIR RFS Innovation Community"), specifically the Biodesign Competition channel (#biodesigncompetition), where we will be posting announcements regarding the competition.
    b. There will also be a "Q&A" channel (#biodesigncomp_qanda) where you can leave any questions you may have and we will answer them. There will also be a "Team formation" channel (#biodesigncomp_teamformation) for anyone who doesn't have a team and is looking to join one. You may post an idea you have and see if anyone would be interested in working with you on the project.
4. Theme
    a. This year's theme for the Biodesign Competition is **Real-Time Procedural Feedback and Confidence in Image-Guided Care**. Teams are also encouraged

to shadow your IR mentor and come up with another theme-relevant clinical issue.

b. The BDIC will be hosting a webinar session featuring last year's winners. The one-hour session will be held in **December**. Teams are highly encouraged to attend the session.

5. Biodesign Resources
    a. BDIC is organizing a Biodesign Webinar Podcast Series this year, which includes a multipart lecture that introduces aspiring entrepreneurs to the basics of biodesign and covers topics from identifying a problem and brainstorming, to actually bringing the concept to market. You can find the links and the summaries on Kinked Wire.
6. Biodesign Competition
    a. There will be no registration deadline this year. Teams are welcome to register anytime as long as they meet the submission deadline on January 15, 2027. Please note that there will be optional check-in sessions throughout the year so the earlier you join the more resources you may receive!
    b. Teams are highly encouraged to begin reading or learning about the theme as soon as possible.
    c. While we do not have strict deadlines, we highly recommend an internal timeline for your team
        i. 1-2 weeks on understanding the problem
        ii. 1-2 weeks on researching current and available solutions
        iii. 1-2 weeks on developing and refining your solution
        iv. 1-2 weeks finalizing your proposal
7. Final Proposal
    a. The proposal should outline the clinical problem, comprehensive needs of the stakeholders, team's solution, and the analytical processes and research used to support your conclusion. In the proposal, teams should demonstrate their understanding of the problem's functional requirements and propose a solution concept that meets the functional requirements identified.
    b. The format of the proposal is left open-ended but should address the requirements outlined in the evaluation criteria. Please limit the write-up to no more than **4 pages**. **Diagrams are encouraged and will not count towards the page-limit.**
    c. Along with the final proposal, teams are required to submit an additional page with the following information to be published on SIR webpage as a graphical abstract:
        i. Title of the project
        ii. 1-2 sentences describing the project
        iii. Illustrative description of your team's design
        iv. Ultimate solution, product, device, app, etc.
    d. The final proposal and graphical abstract should be emailed to sir.msc.biodesign@gmail.com and nate.ji@icahn.mssm.edu by the date indicated

in this syllabus, as well as submitted to the linked registration & submission form on the original announcement post.

8. Finalists presentation
    a. All selected finalists will be invited to present their projects in slide deck (PowerPoint) format prior to the SIR finals. Presentations should be kept to a maximum length of 10 minutes.
    b. Please keep in mind that if presenting, all participants and clinicians will be very knowledgeable about the subject matter, i.e. there is no need to spend much time going over the disease process.
    c. The top four teams will be selected to present at the annual SIR meeting on March 20, 2027.
9. Feedback / Survey
    a. At the end of the event, feedback forms will be sent out to all participants. Please take time to fill out the form thoughtfully. Your evaluations are important to us so that we can make future biodesign competition events even better for you and your colleagues.
10. Prizes

    Prizes may vary To be announced later.
    a. The winning team will have the opportunity to be interviewed for next years webinar/podcast

11. Disclosure
    a. Please keep in mind that the abstract, website, and live presentation will be available to the public, **so what your team decides to disclose will be at your own discretion.** The final proposal will only be viewed by the attendings who will be evaluating you. **This may affect the timeline teams will be able to file for intellectual property protection.**

Evaluation Criteria

Team's proposals and presentations will be evaluated based on the rubric below.

<u>The following is a basic template for the written proposal:</u>

Defining Problem and Collect Information

What is the problem?
Who is the customer?
Who is the beneficiary? Patient? Provider? Both?
What is the desired outcome?
What are the constraints?
Who are the stakeholders?
How have others approached the problem?

Brainstorming and Analysis

What are the disease state fundamentals?

Functional decomposition of the problem?
Brainstorm some solutions to the problem?
Is a new design or new technology required or can an existing technology be adapted?

Developing Solution

Solution selection
Solution feasibility
Commercial viability

Evaluation Criteria for Written Proposal	**Evaluation** 1 (lacking) to 5 (excellent)
1. Prompt compliant - *How well does this team's solution fit the theme?*	
2. Problem comprehension - *How well does the team exhibit an understanding of the problem? Were they able to define a solution-neutral description? Is their understanding based on current research? How well did they define primary, secondary, and tertiary stakeholders? How strong was their understanding of the existing market landscape and designscape?*	
3. Discussion / Theory of solution - *Does the team explain clearly how their solution solves the problem? Does the solution meet the functional requirements of the problem they outlined?*	
4. Defense of solution - *Does the proposed solution have any supporting evidence? Do they cite and interpret relevant clinical information? Without creating a prototype, is the team able to demonstrate reasonable feasibility?*	
5. Potential constraints - *What are potential reasons or clinical scenarios in which the product should not be used? What are limitations of the proposed solution? What future work needs to be done?*	
6. Commercial potential - *How does this solution, in your opinion, compare to other existing devices and products? If there are similar ideas currently exist, why is theirs superior? Does the team demonstrate a solid understanding of the economic landscape?*	
7. Graphical abstract - *Is their graphical abstract concise and informative? Does it capture the essence of their project? Do the visuals enhance the narrative?*	
8. Short pitch - *Does their pitch grab your attention and make you want to hear more? Are the visuals helpful? Do they cover the essential topics, such as those listed above?*	

Evaluation Criteria for Short Pitch	**Evaluation** 1 (lacking) to 5 (excellent)
1. **Presentation** - *Does the pitch grab your attention and matain engagement throughout? Does the team fit the short presentation in*	

	the allotted time? Is the presentation visually appealing? Is the presentation clear and concise?	
2.	**Problem comprehension** - *How well does the team exhibit an understanding of the problem? How well did they define stakeholders? How strong was their understanding of the existing market landscape and designscape?*	
3.	**Solution discussion**- *Does the team explain clearly how their solution solves the problem? Does the solution meet the functional requirements of the problem? Does the team provide a defense of their solution? Does the team explain the commercial potential of their product*	

Note: The final score will be an average of the proposal and short pitch grade. The weight of the proposal and short pitch will be 75% and 25% respectively.

Biodesign Competition Calendar and Timeline

October 20, 2026

- Biodesign Competition syllabus, theme & prompts released to teams

October 2026 - January, 2027

- Biodesign webinar sessions
- Optional team check-ins

January 15, 2027

- Proposal and Pitch submissions due

Late February 2027

- Finalist Result sent out

March 20, 2027 at SIR 2027

- Face-Off between four finalist teams at SIR 2027

Resources for Teams

Below are tips to help guide you in the biodesign process:

1) Join the Slack Channel and look for potential teammates.
2) Refer to theme document
3) Reach out to your IR attending mentor for help with brainstorming ideas as well as any other IR questions you may have.
4) Contact the BDIC if you have any questions about competition logistics.
5) See previous year's 5 minute pitches (2022, 2021, 2020) as well as the finalist face-off (2021, 2020).

6) Listen to the recordings of the Biodesign Webinar Podcast Series on Kinked Wire to learn more about the design process and learn strategies for tackling your problem.
7) Reach out to friends or family in disciplines other than your own to see their unique perspective on the problem.

Tips for Success

The Biodesign Competition requires you to take the initiative to step out of your comfort zone, learn new skills, and tinker in domains that you may not be familiar with. Through this experience you may struggle and feel lost at times, but we encourage you to power-through and embrace uncertainty because in the end, you will improve yourself by making sense out of the seemingly unrelated areas of investigation.

Failure is a natural process for any entrepreneur and to be successful, you have to accept failure, learn from it, and be persistent on the path to your goal. This challenge can be difficult, so we wanted to provide you with tips to help you succeed on your journey. While our tips are not exhaustive, we believe that they are a good point of reference in case you get stuck or need another point of view during the Biodesign Competition.

1. Read the prompt right away
2. Thoroughly investigate the problem before thinking of solutions to the problem
3. Think about the end user as well as all of the ancillary people involved
4. Define the problem in your own words
5. Write down many different solutions to your problem before discussing possible solutions with your group; do not be afraid to be a contrarian and question the status quo in a respectful manner
6. Work out team meeting logistics ahead of time
7. Get in touch with your IR attending advisor early and develop a strong mentor-mentee relationship
8. Keep an eye on the slack channel for any announcements
9. Watch the Biodesign Webinar Series to learn more about the design process and learn strategies for tackling your problem
10. Watch Dr. Kieran Murphy's webinar "Where Good Ideas Come From"
11. Think about simple solutions that go against current standards and find out why they will not work, or why they may work
12. Do research and figure out what already exists and is similar to your idea
13. Keep a design notebook with you at all times and use it throughout the day whenever you have good ideas or see problems that don't have good solutions yet
14. Get feedback from mentors and colleagues
15. Iterate new versions of your solution as you receive feedback
16. Keep an open mind and do not prematurely focus all of your energy on one solution
17. Embrace the diversity of backgrounds on your team; welcome undergraduate and graduate students that specialize in fields other than medicine
18. Importance of non-judgemental design approach

“Everything around you that you call life was made up by people that were no smarter than you.”

- Steve Jobs

Frequently Asked Questions

Frequently Asked Questions: As the Medical Student Council IR Biodesign Competition begins, the Biodesign and Innovation Committee will be collecting frequently asked questions and updating this section.

How big should my school’s team be?
We think that **4-5 people** is about the right size for a competition team. With additional team members, team logistics becomes more of a challenge. If your school has more people that want to participate in the IR Biodesign Competition, consider creating additional teams.

How will my team’s work be evaluated?
Teams’ biodesign work will be evaluated as described in the evaluation criteria section. While the final product is what most people look at, a large component of our evaluation will come from your team’s analysis of the problem and understanding of the functional requirements that allow you to justify your solution concepts.

What happens if my team comes up with an awesome idea that I want to pursue further?
Great! Consult with your team mentor on how to best proceed. Determine what resources your school has for securing intellectual property (e.g. technology transfer office). We could also connect you with mentors in the industry space.

Can I add this to my resume?
Yes! You and your team’s information provided during registration will be posted on the website as verification of participation. The videos of the presentation will also be posted on the SIR RFS YouTube channel. The finalists will also be invited to present at the SIR 2027 Conference.

Will my intellectual property be protected if I participate?
Generally, no. Assume anything you submit becomes part of the public domain. See next page for further information.

United States Trademark and Patent Law Considerations

United States Patent Law is something which must be considered before entering into the Biodesign Challenge Series. The remote means by which attendees and participants may be involved with the competition raises the issues of both public disclosure of the inventions/solutions as well general non-disclosure agreement ("NDA") usage.

In 2013, United States Patent Law transitioned from a "First-to-Invent" system to a "First-to-File" system. Essentially, the "First-to-File" system allows a person who files the requisite paperwork first to claim ownership over a submitted idea or design, whether the design was theirs or not. Public disclosure of an idea or design opens the inventor(s) up to non-actionable idea/design theft if a non-disclosure agreement is not already in place prior to the disclosure.

This leads to our second problem - having an enforceable non-disclosure agreement given the remote attendance and participation aspect of the competition. The mandatory signing and returning of a non-disclosure agreement is unwieldy and almost impossible to enforce. Because of this, the audience and participants will not be required to complete NDAs prior to participation or viewing.

It's advisable participants carefully consider these factors when moving forward with Series entry and/or assembling their abstract and presentation. For inventors who may have already begun developing ideas, Provisional Patents offer basic protection of an idea/design for one year from the date of filing. See the related source links below for further information.

Sources:

1. https://www.uspto.gov/patent/laws-and-regulations/america-invents-act-aia/patents-examination#heading-10
2. https://www.uspto.gov/patents-getting-started/patent-basics/types-patent-applications/provisional-application-patent
3. https://www.upcounsel.com/first-to-file
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