Research Proposals

20.109 Communication Workshop 6

MIT BIOLOGICAL ENGINEERING
COMMUNICATION LAB
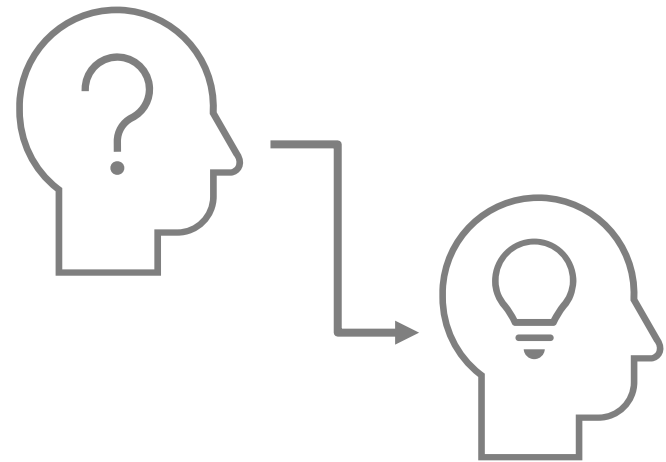
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Say you have $1 million to give to someone's biological engineering project

What would you want to know
from the person you're giving it to?

Today's agenda:

Key tips for research proposal presentations

Brief overview (more resources on wiki)

Work in teams to refine and get feedback on your pitch ideas

Leave with a pitch for your problem/approach idea

Plan ahead to incorporate feedback

Get input from peers and teaching staff in section to build on your idea

Research proposal presentation: logistics

Team presentation of your idea
12min + Q/A

A few basic tactics will get you very far:

- Clear visuals with high signal to noise
- Strong title messages on slides
- Storytelling with clear messages and logic
- Hourglass structure to draw the audience in

A successful proposal must convince its audience that the proposed work is **significant** and **achievable**.

How might you get the audience on your side?

Include a slide that highlights the **impact** this work would have on society and science

Why is this work important?

Why should someone give you money to do this work?

Tell us the essential **why**, **what**, and **how**

Why   Identify the gap/need or advance

What   What is the clear idea you propose to try?
Impact?

How   Key steps to accomplish goals ("aims")

We care about the **methods**:
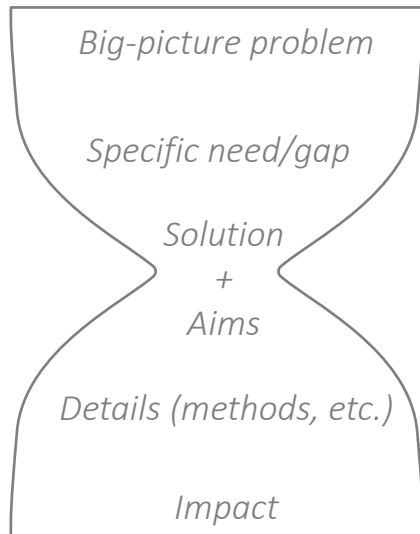specify techniques, *in vitro, in vivo*, what system

Show us **expected data**
If things don't work, what will you do?
Have controls and work-arounds

Significant

Achievable

Use both slides & speech to convey main points

Big-picture problem

Specific need/gap

Solution
+
Aims

Details (methods, etc.)

Impact

- Briefly introduce yourselves and the project

- Give minimally sufficient background to identify a clear **problem** and **approach**

- State the overall aim and goals ("specific aims")

- Describe each goal's **methods** and logic

- Show you've thought about predicted outcomes, alternate approaches, needed resources

- impact (scientific or societal) if all goes well

Tell us the essential **why**, **what**, and **how**

Why	Identify the gap/need or advance
What	What is the clear idea you propose to try? Impact?

Significant

How Key steps to accomplish goals ("aims")

We care about the **methods**:
specify techniques, *in vitro*, *in vivo*, what system

Show us **expected data**
If things don't work, what will you do?
Have controls and work-arounds

Achievable

A compelling way to present your idea is to connect the need to the solution

Attention getter

⬇

Unmet need

⬇

Solution

Hook audience attention with a summary of your proposal and its value

Keep it **concise** (~30 seconds), use **plain language**, and **set the stage** for your presentation

Communicate "so what" message of why we should care

For example:

Attention getter

↓

Unmet need

↓

Solution

Human papillomavirus (HPV) infections cause nearly all cases of cervical cancer worldwide. While there are over 150 genotypes of HPV, only a handful of genotypes cause cervical cancer and current diagnostics cannot provide same day results for which genotype is present.

That's why I am building a rapid diagnostic to genotype HPV and screen for cancer risk using programmable toehold switches and CRISPR enzymes to detect specific DNA or RNA sequences.

For example:

Attention getter
↓
Unmet need
↓
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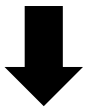
Is there anything missing that you want to know?

Put your punchline up front and end on impact

| Attention getter |
| Solution |

↓

| Unmet need |

↓

| Impact |

I am building a diagnostic to genotype HPV and screen for cancer risk by rapidly identifying the handful of HPV strains that cause cervical cancer out of over 150 genotypes that exist. This will allow us to provide a rapid, same-day diagnostic for Human Papillomavirus, an infection that cause nearly all cases of cervical cancer worldwide. Using this diagnostic we can accurately treat patients in a timely manner.

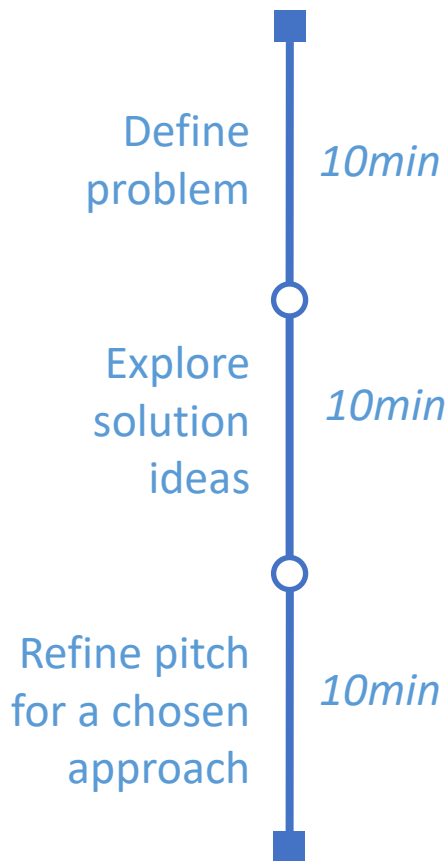# The introductory pitch can guide the storyline of your overall presentation
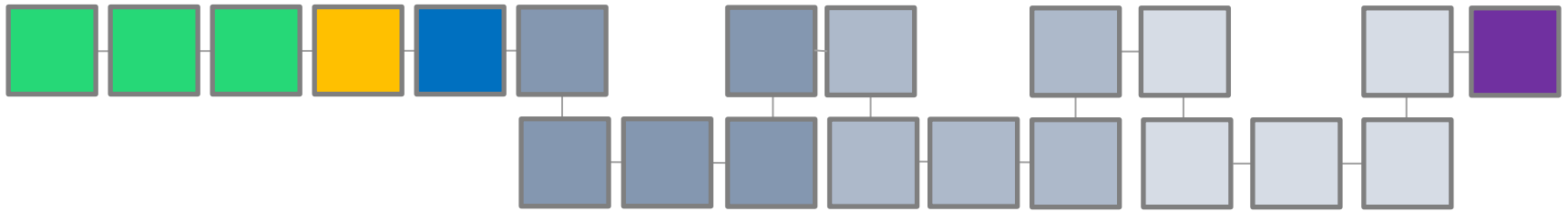
Human papillomavirus (HPV) infections cause nearly all cases of cervical cancer worldwide. While there are over 150 genotypes of HPV, only a handful of genotypes cause cervical cancer and current diagnostics cannot provide same day results for which genotype is present.

That's why I am building a rapid diagnostic to genotype HPV and screen for cancer risk using programmable toehold switches and CRISPR enzymes to detect specific DNA or RNA sequences.

Using this diagnostic we can accurately treat patients in a timely manner.

Craft a pitch of your research question and idea for a solution

Define problem

10min

Explore solution ideas

10min

Refine pitch for a chosen approach

10min

What problem do you propose to address? How might BE offer a solution?

Consider:

- what problem / unmet need is being addressed?

- how does your suggested approach incorporate both biology <u>and</u> engineering?

- how will this advance the field / build on what is already known?

- **Start planning now about how to incorporate feedback into your design**

  - Are there any aspects of your idea that you're unsure about?

    How will you make sure that you get feedback on these?

  - If a scientific challenge is raised, how might you address it?

    Iterative design cycles: pivot vs. persevere

Acknowledgements

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