

IGEM IISERTVM TEAM 2022

PROJECT REVEAL



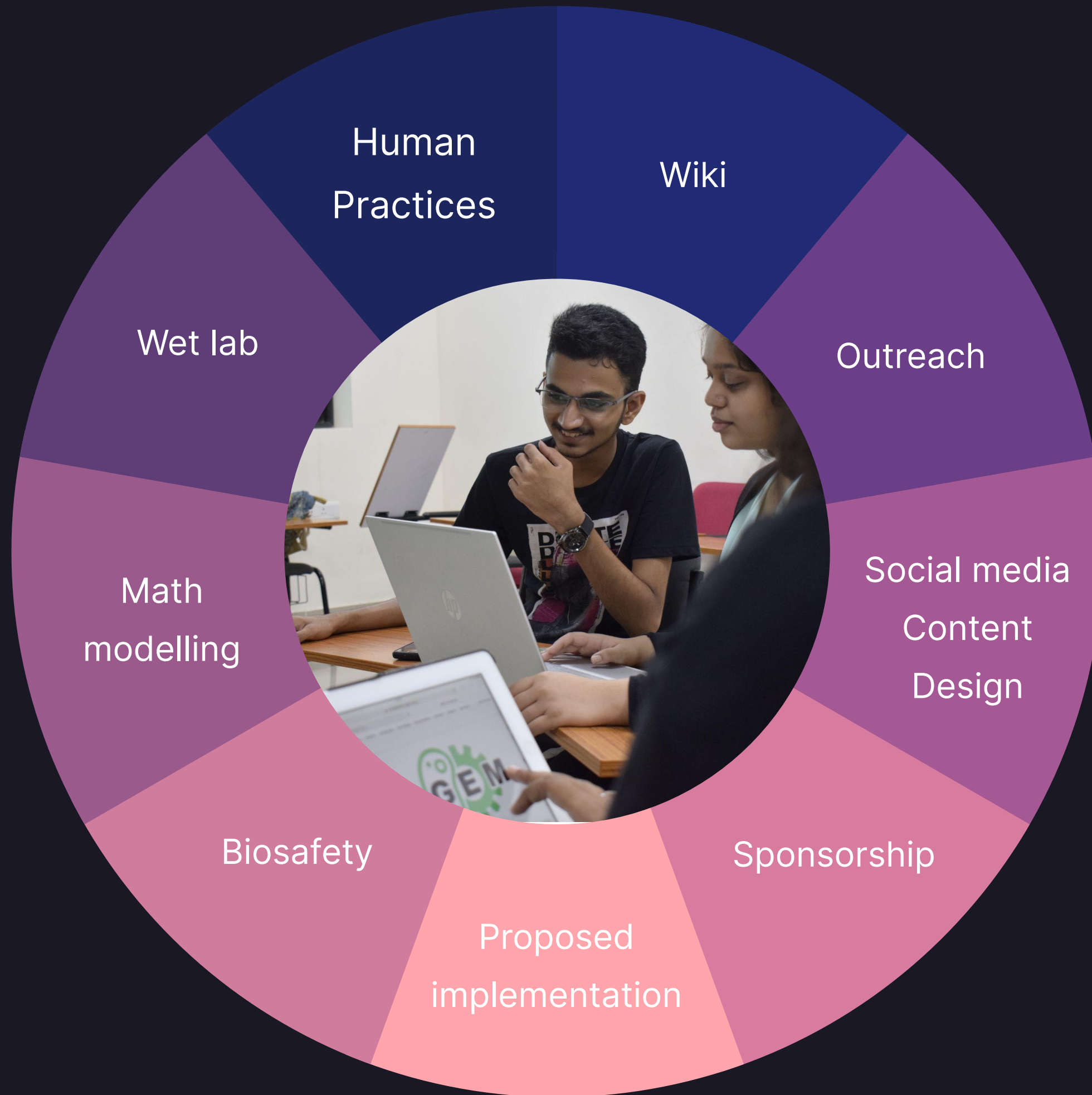


duonco

A dual nanovesicle drug delivery system.

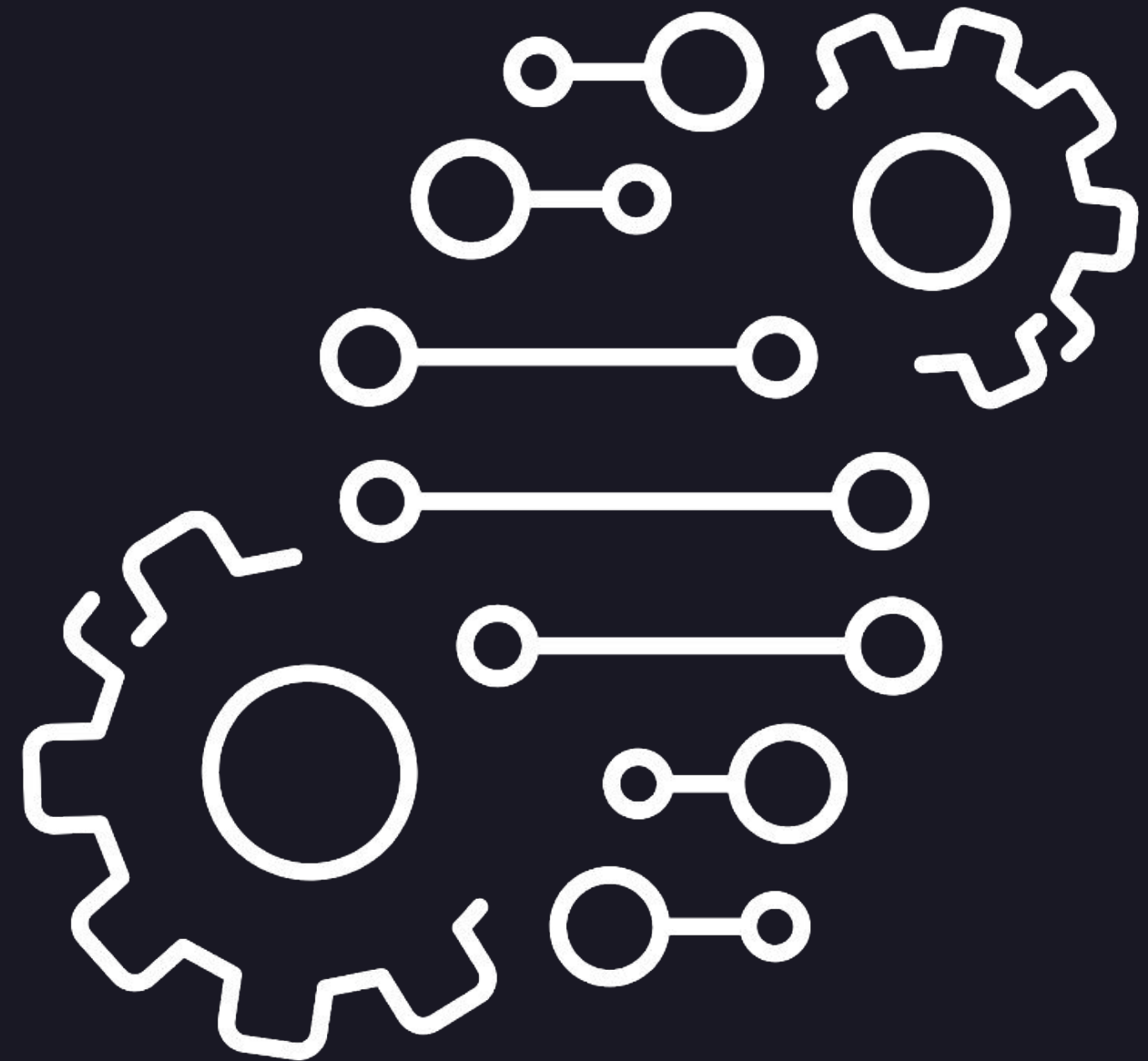
What is iGEM?



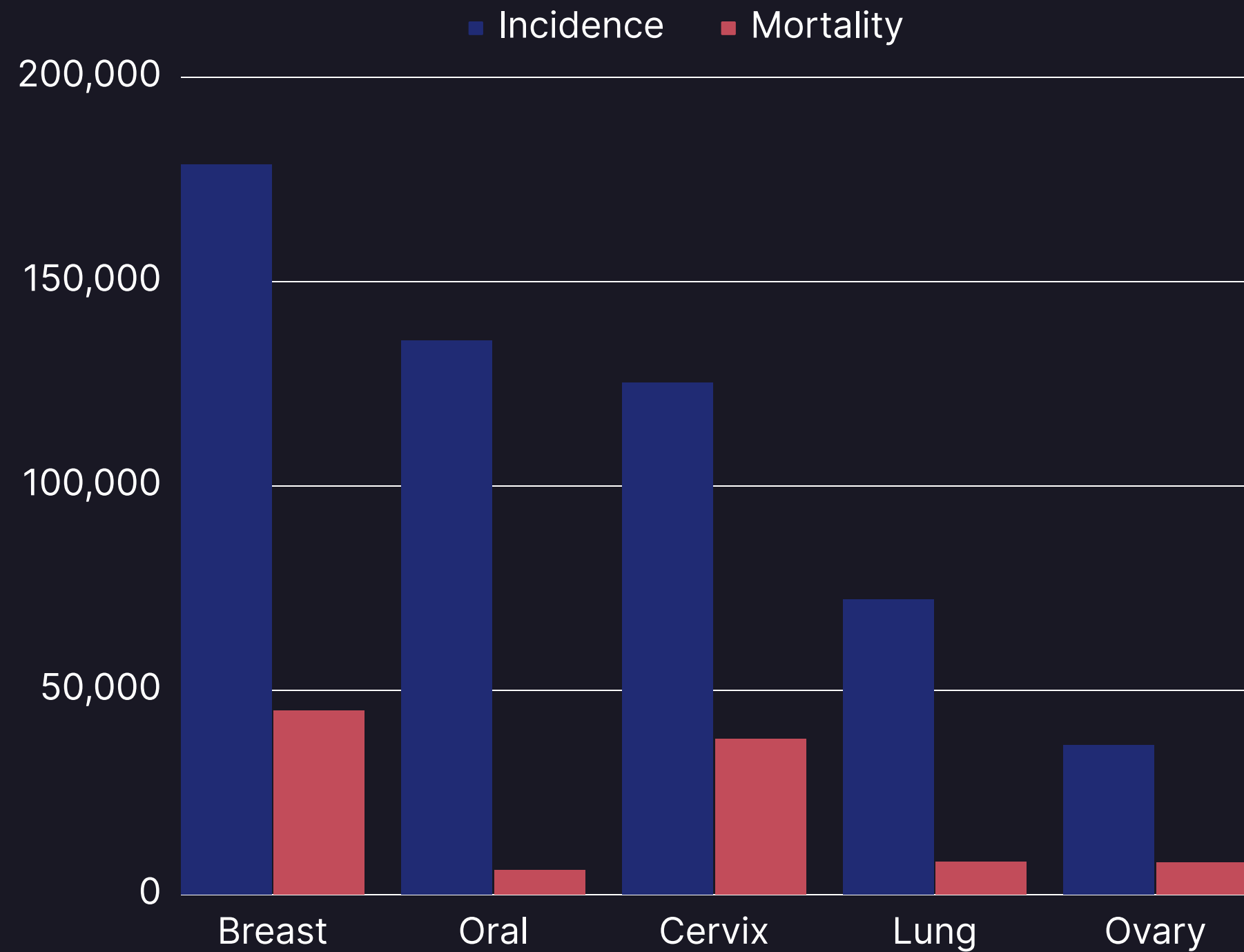


What is Synthetic Biology?

- A multidisciplinary field that involves applying engineering principles to biology.
- Creation of new parts, redesigning pre-existing systems in nature.



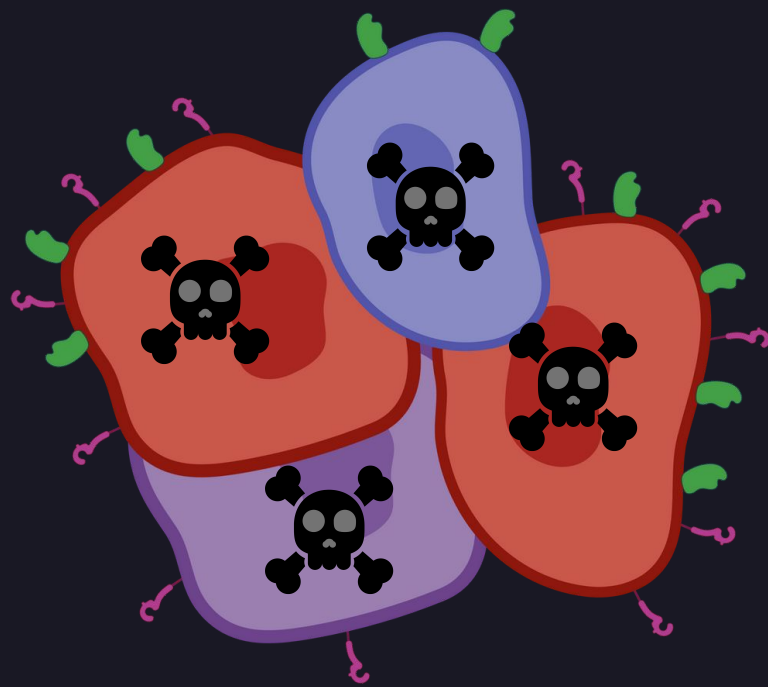
Cancer Statistics



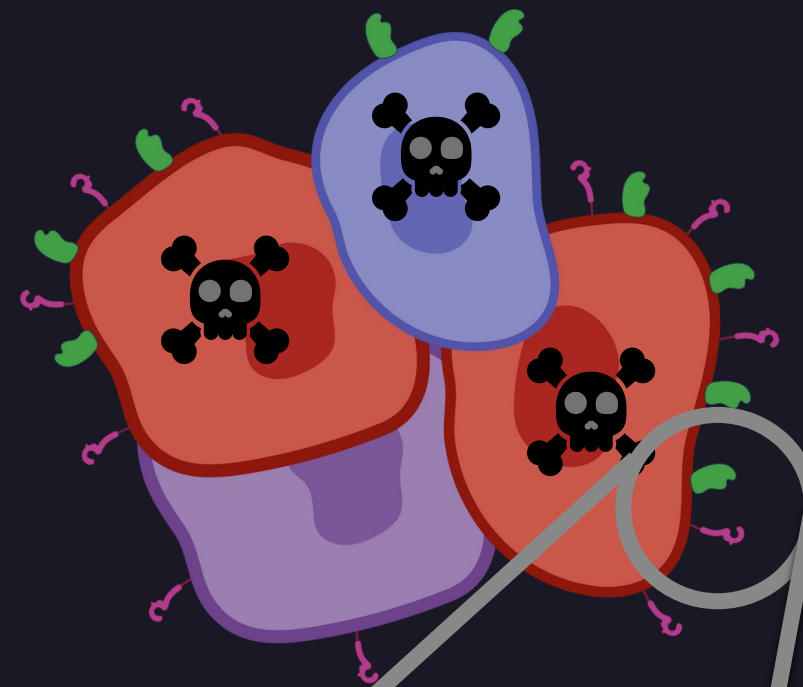
Total cases of incidence and mortality for India recorded in 2020, for all age groups and all sexes

Drug Therapies for Cancer

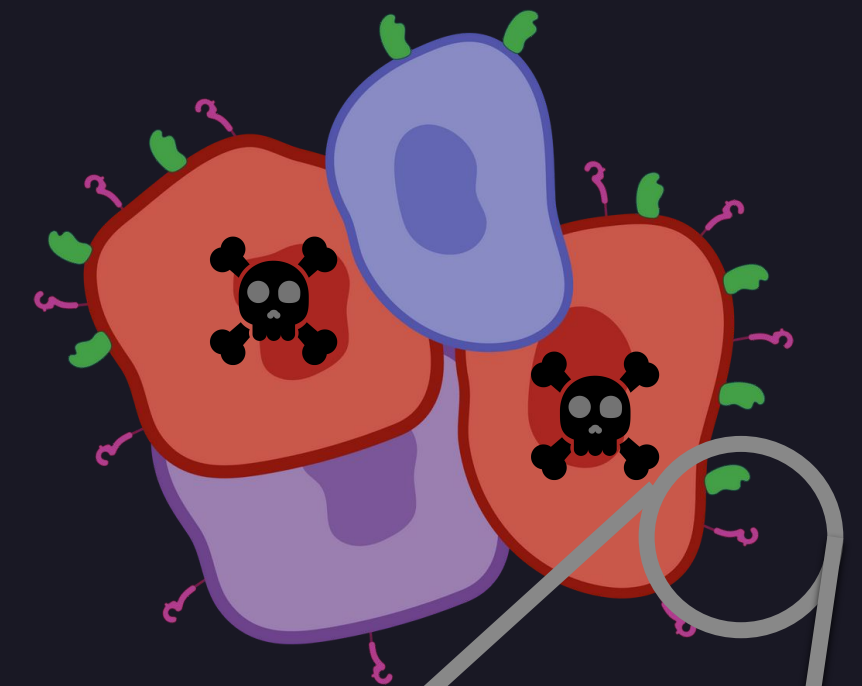
Chemotherapy






Targeted therapy



Our solution



-  cancer cell
-  normal cell
-  normal cell

Drug carrier

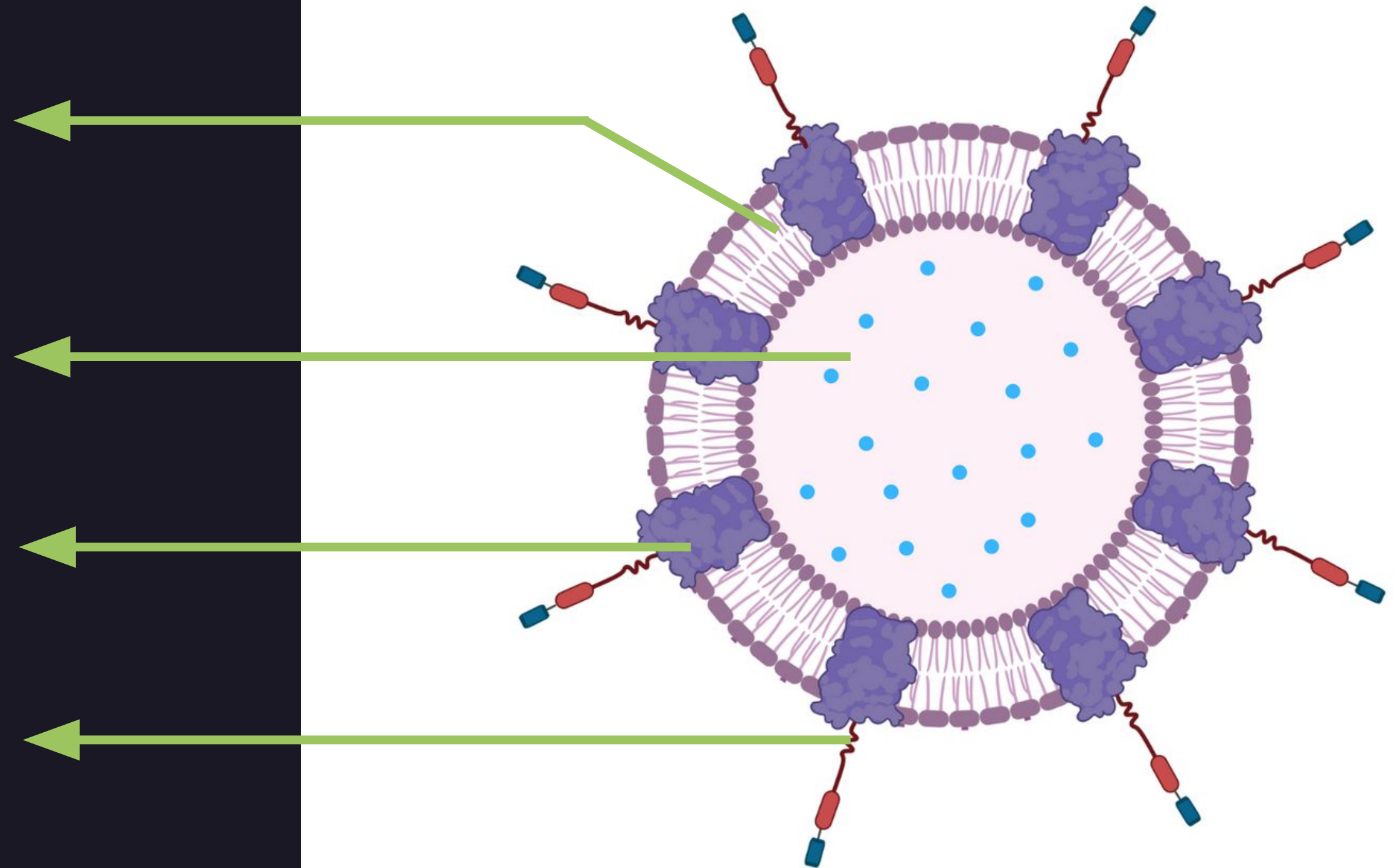
Bacterial nanovesicles

Carry payloads

Immunostimulatory

Express affinity proteins
on the surface

Outer Membrane Vesicles (OMVS)



Affinity Proteins



HER2 receptor



HER2 affibody

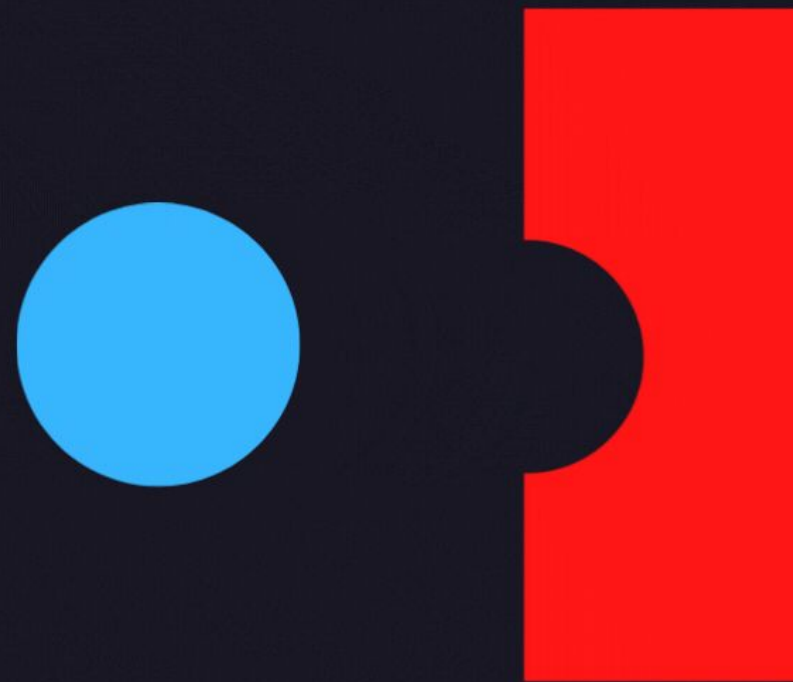


Tumour homing peptide



C5AR1

Prodrug-Enzyme System



Prodrug (Inactive form) + Enzyme = Active Drug

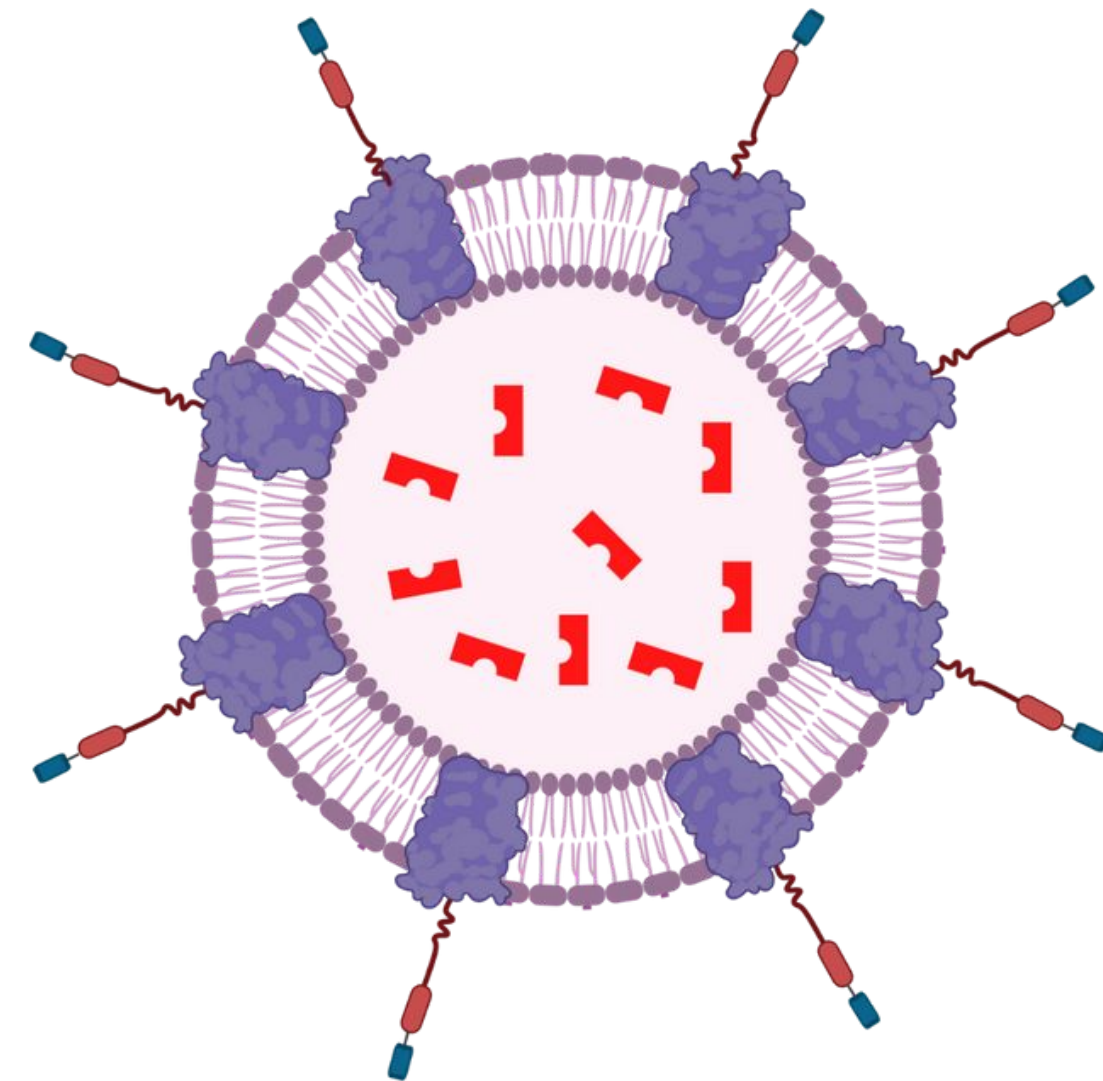
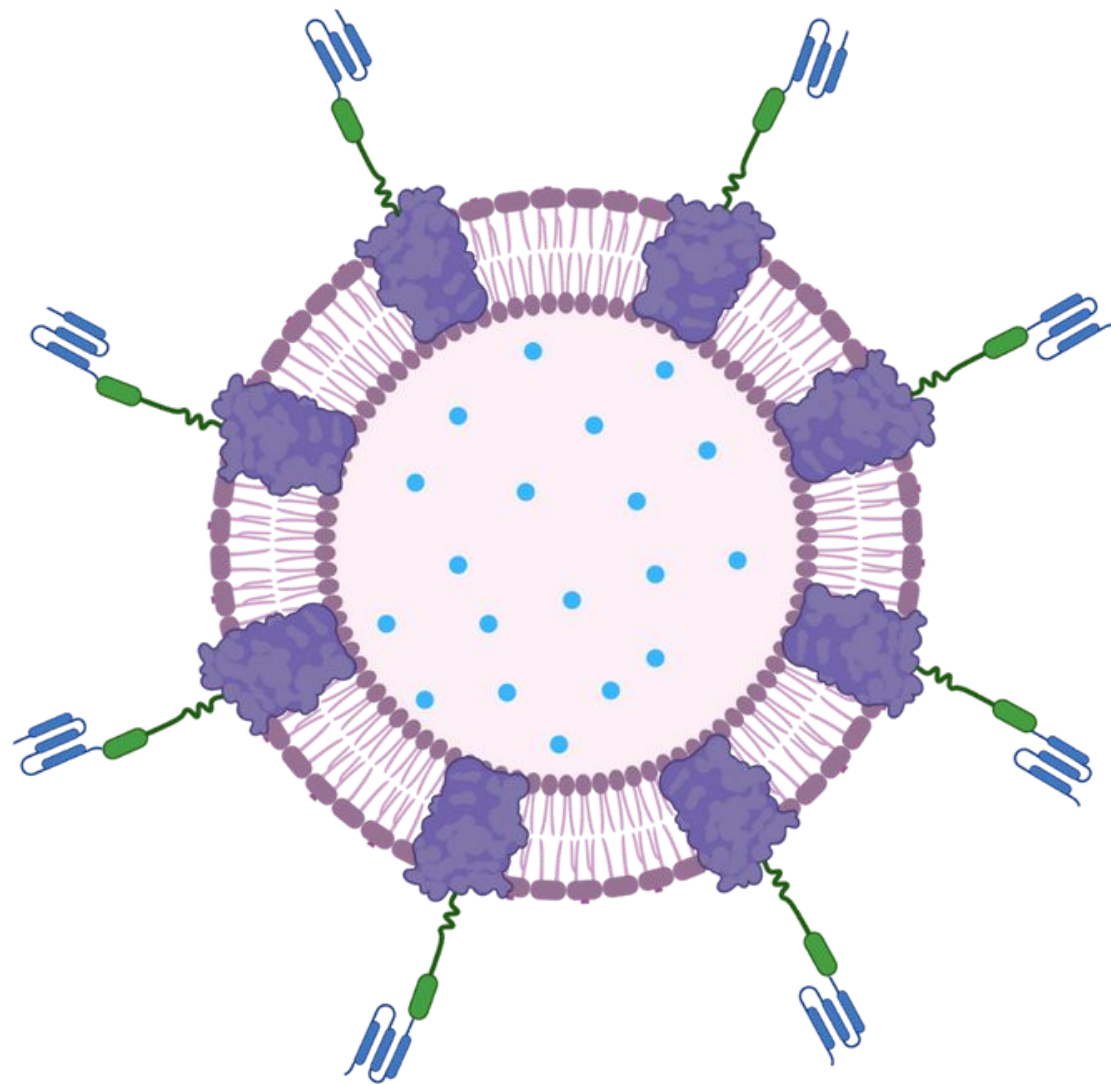
Dual vesicle system

Type A OMV
for HER2

Type B OMV
for C5AR1

Affibody

Prodrug



Tumour homing peptide

Enzyme

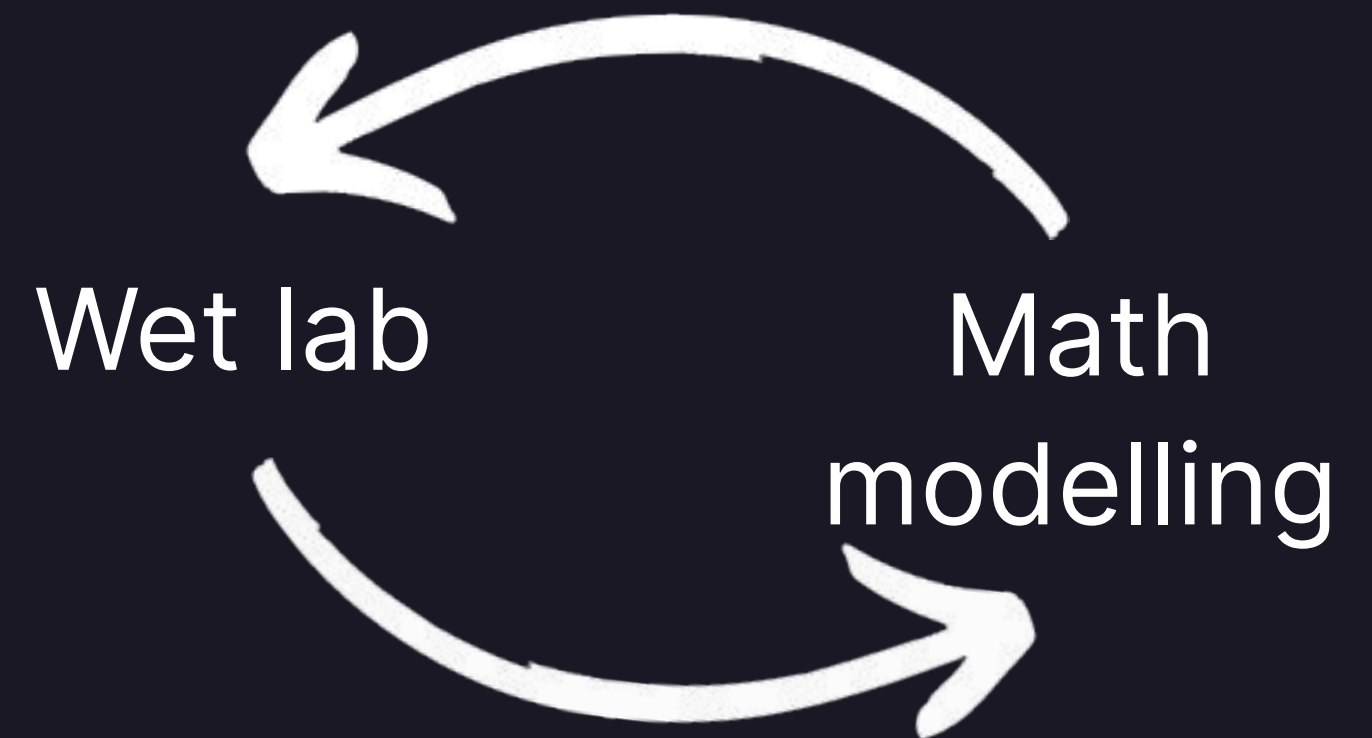
Significance of the Project

- Double check mechanism by dual vesicle system
- Novel combination of parts
- Versatile and customizable system



Math modelling

- Describe and predict system behaviours
- Model = equations + simplifying assumptions and constraints
- Complements lab work + explores other aspects



Math modelling

- Predicting protein expression
- Docking affinity proteins with receptors
- Prodrug-enzyme interaction
- Internalization of the vesicles
- Drug concentration



Proposed Implementation

- Implementation in real world
- Future safety aspects
- Other challenges to consider
- Who will be the end users and how will others use our project?

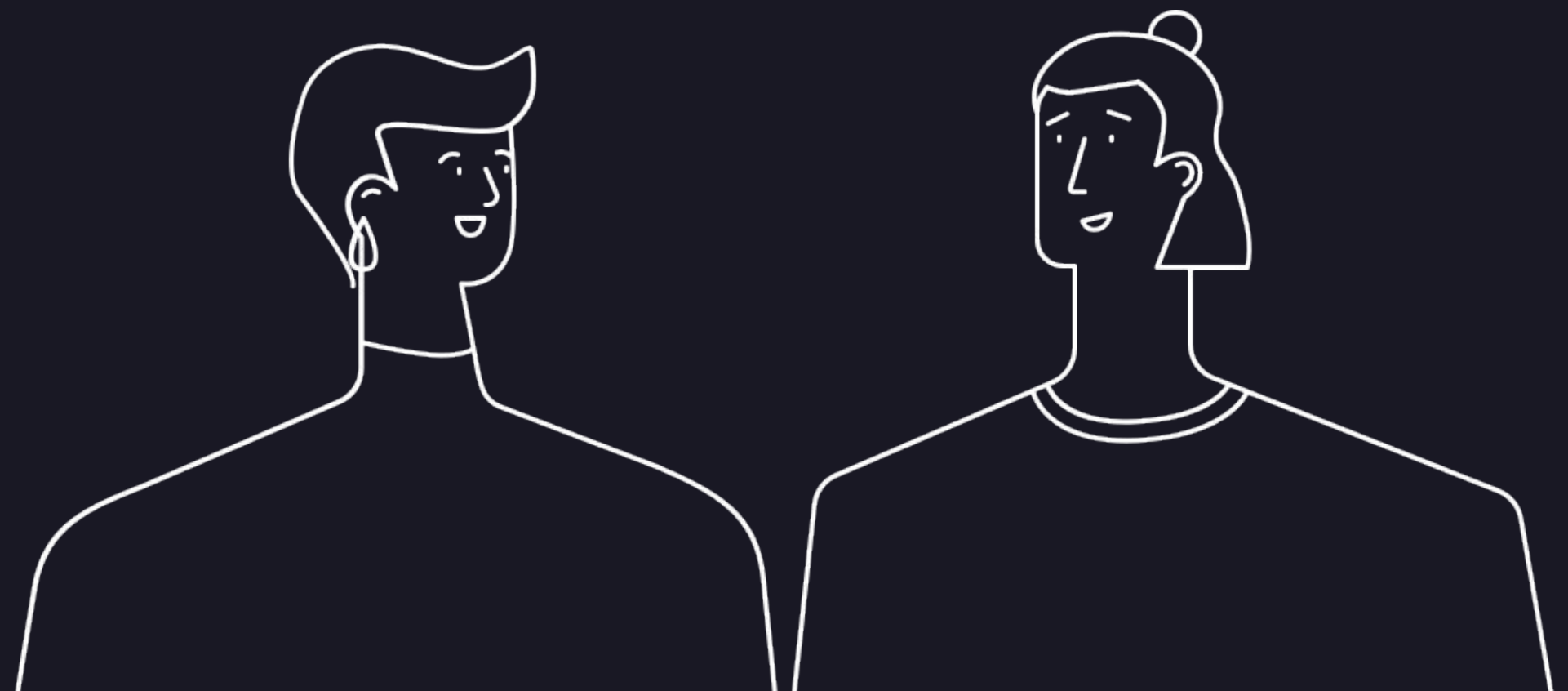


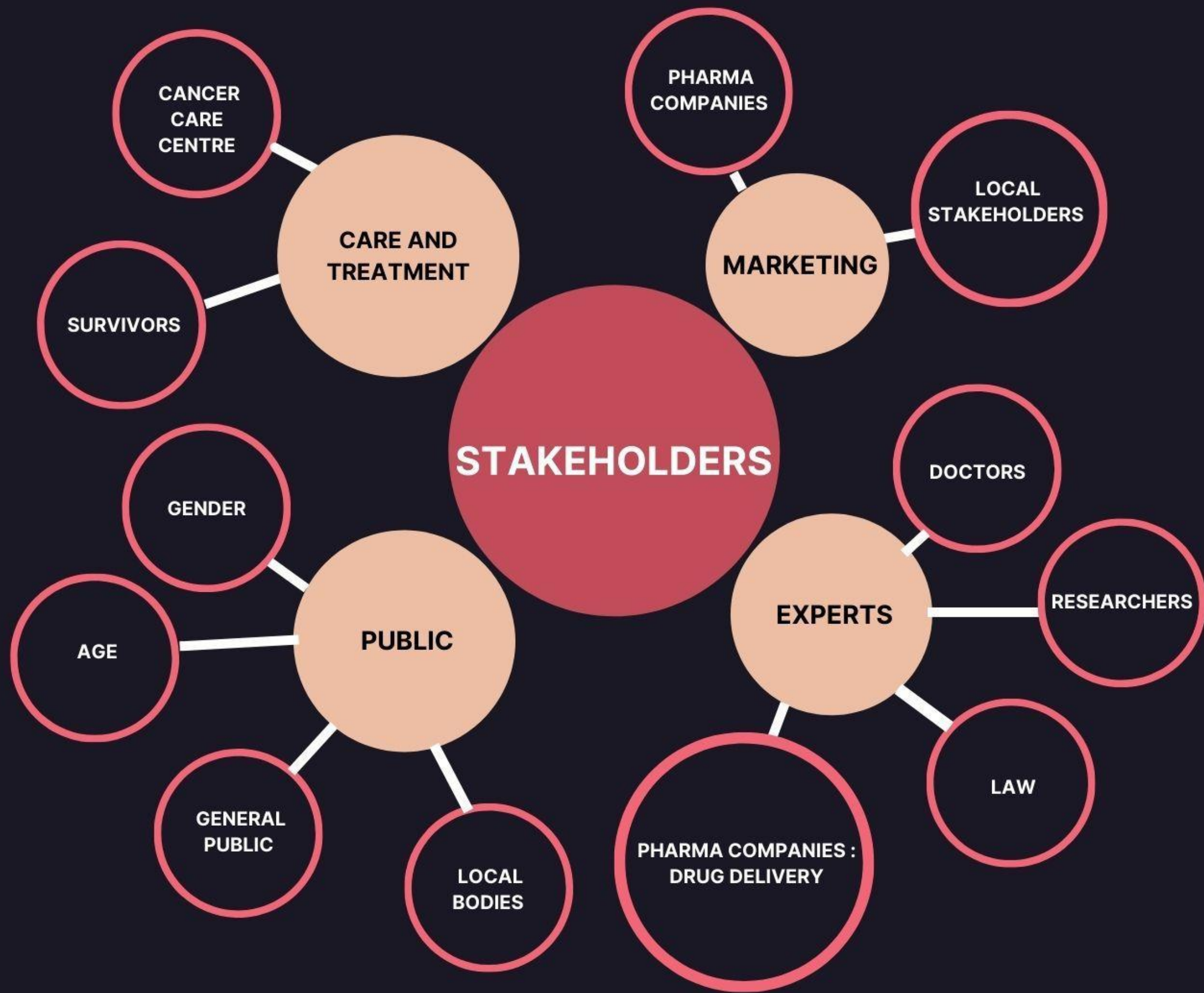
Human Practices

"Human Practices is the study of how your work affects the world,
and how the world affects your work."

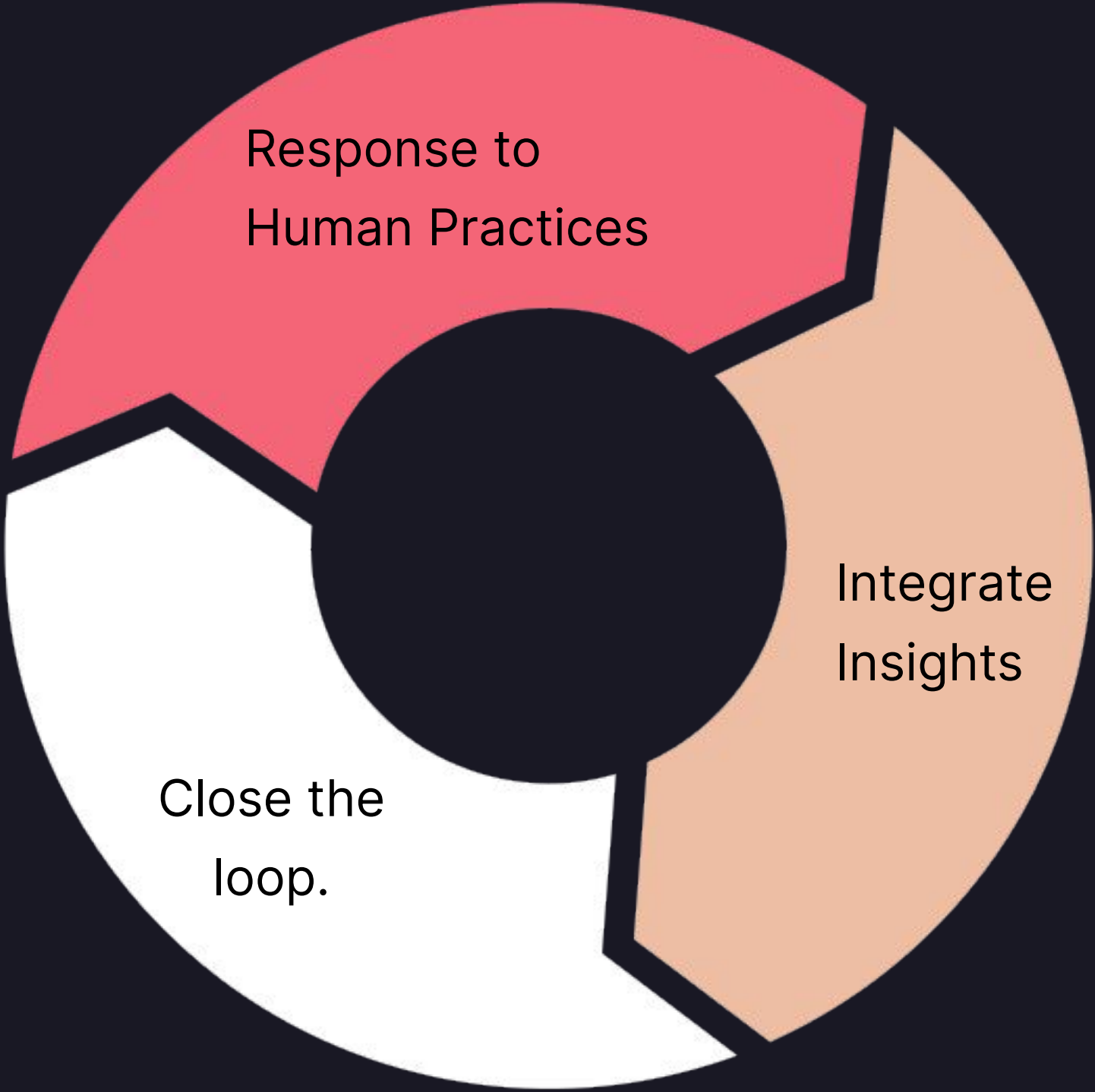
- Peter Carr

- Reflection
- Responsibility
- Responsiveness





Integrated Human Practices



Biosafety & Law



- Reviewing biosafety laws
- White list
- Human subjects research
- Making sure everyone is safe

OUR SAFETY IS MY RESPONSIBILITY

Wiki



- Face of our project
- Communication with the entire world
- Hosted in the iGEM server
- Frontend and backend

Design & Content



- Designing the social media content
- Communicating to the audience.
- Providing scientific awareness
- Various aspects of synthetic biology

Education & Outreach

Collaborations

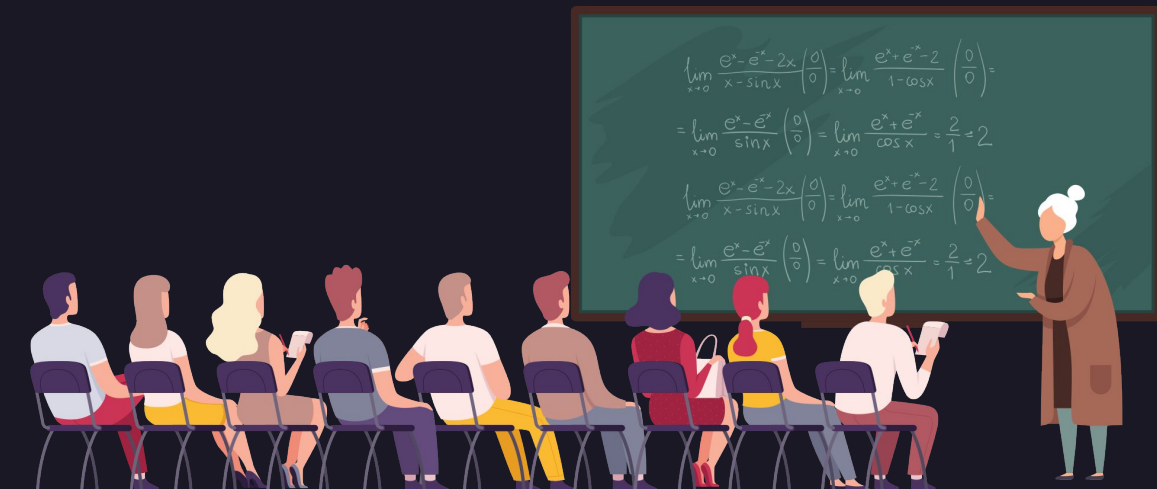
Collab with NGO and other iGEM teams

Competition

Conduct competitions at school, college level and for general public

Outreach

- Summer camps
- Talk series
- Science career talks
- Attend conferences



Inclusivity

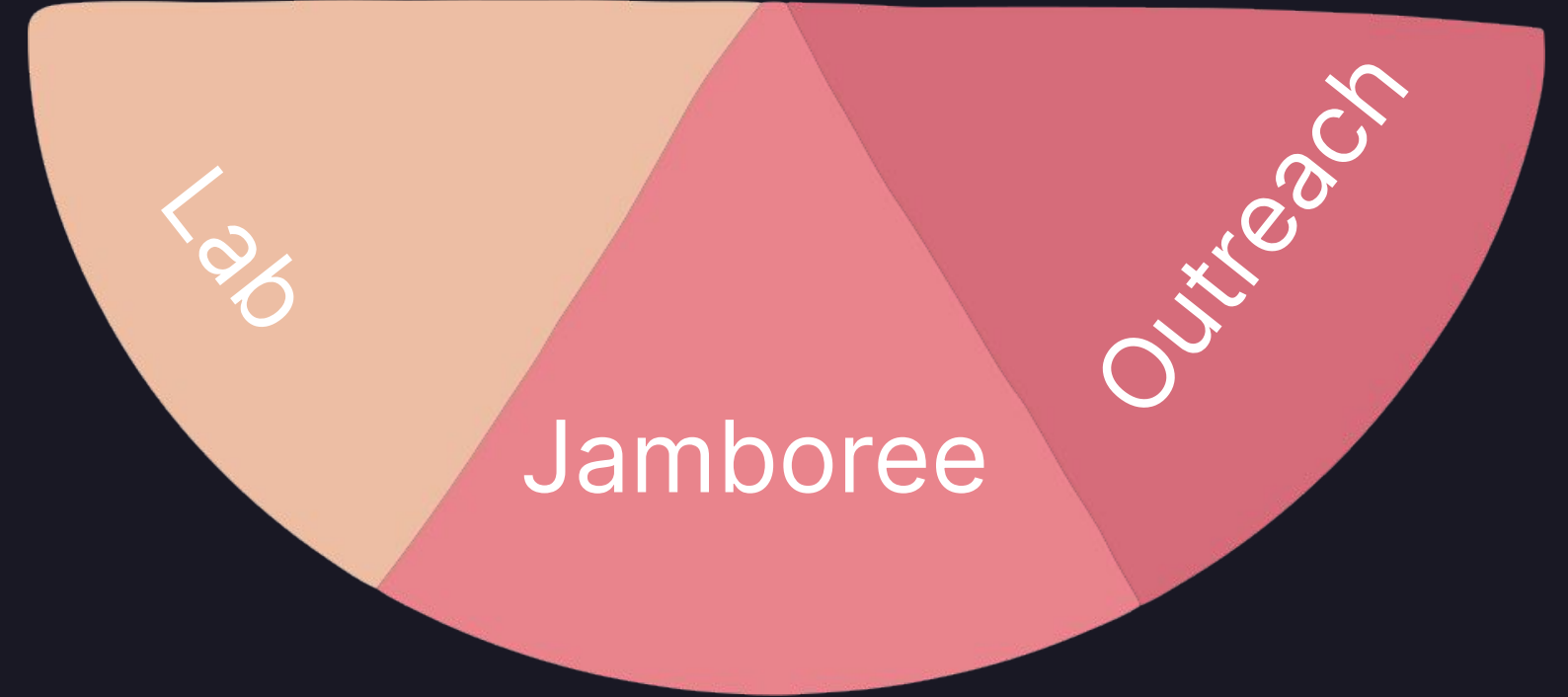
- Multiple - language survey on public awareness of science

- Breast Cancer Talk Series from survivors in different fields

- Multilingual subtitles for promo videos, flyers, pamphlet and youtube contents.



Sponsorship



Companies

Grants



Crowdfunding

Social Media

