Better outcomes and greater efficiency:

Module Two: Logic Models and Ways of Knowing (Assessments)

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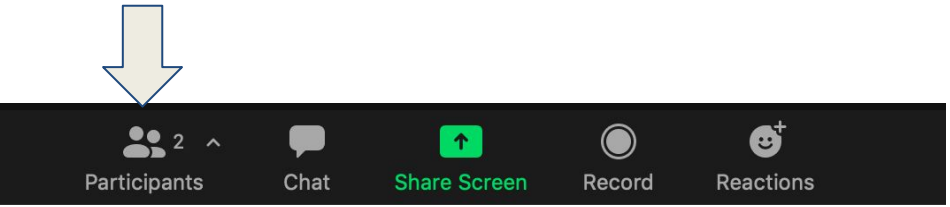
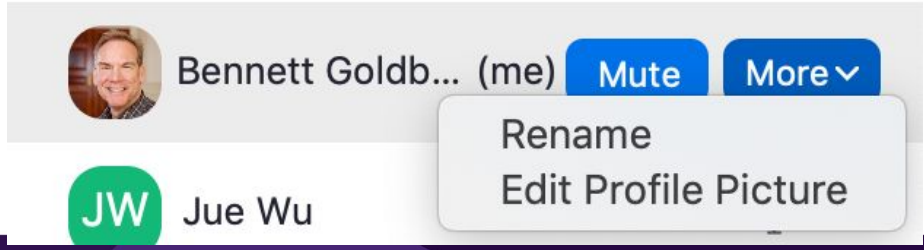
Please rename yourself for breakouts:

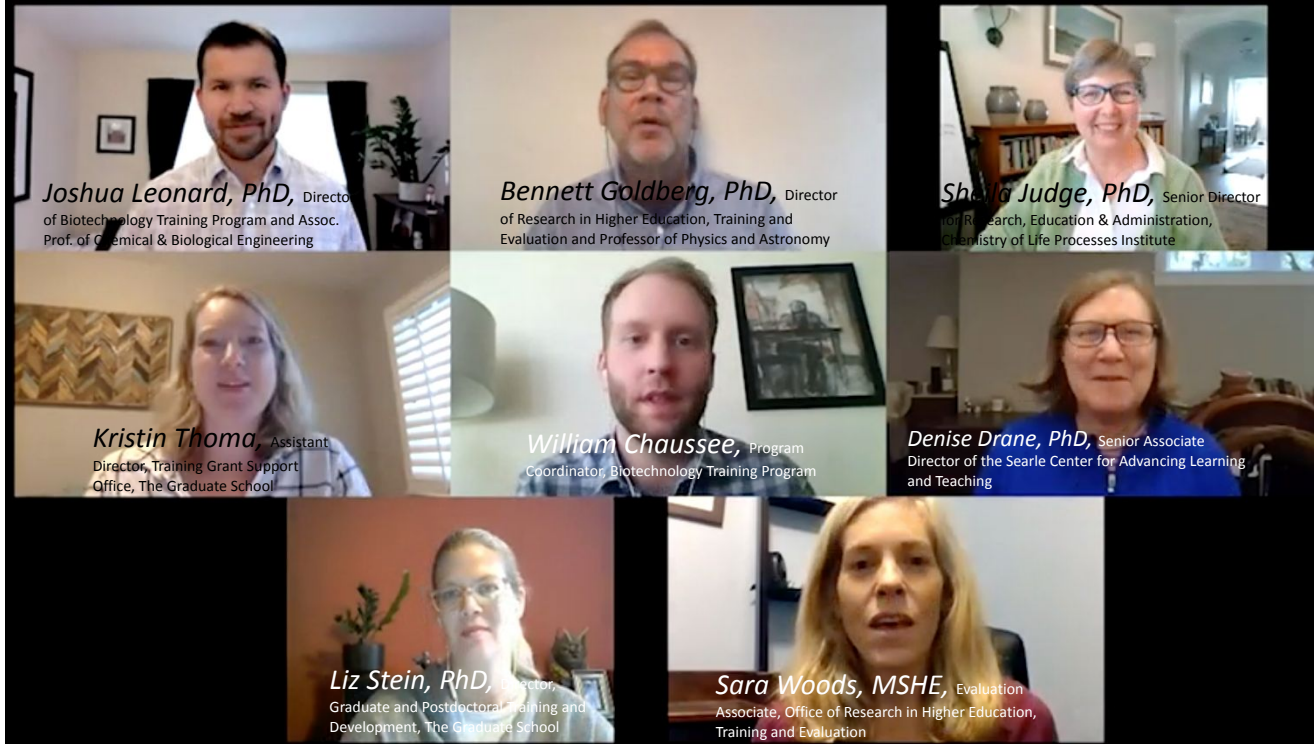
Add a number to the front of their names:

- **1** - If your project is for clinical trainees/scientists
- **2** - If your project is for predoctoral trainees
- **3** - If your project is for postdoctoral trainees
- Use **2/3** if your project has both





Project Team



NIH 2T32GM008449-26

National Institutes of Health

Northwestern | Chemistry of Life Processes Institute

T32 Evaluation Project

Goal: to create, develop, implement and test evaluation capacity-building training and structures for NIH T32 predoctoral training programs at Northwestern, with the long-term objective of initiating campus-wide improvement in evaluation and assessment of graduate training in biomedical research.

- Aims:
  1. Develop evaluation skills of training grant directors and key personnel; 3 workshops being developed
  2. Develop, test and disseminate policies, procedures and standards for training program evaluation;
  3. Create a community of excellence in graduate training and evaluation.

Spring workshops (May 2021)-Implementation and Program Improvement

By the end of this workshop

You will be able to

- Construct a logic model
- Use in program design & evaluation
- Begin to construct more robust assessments
- Understand the T32 evaluation framework at NU

You will have access to templates & resources

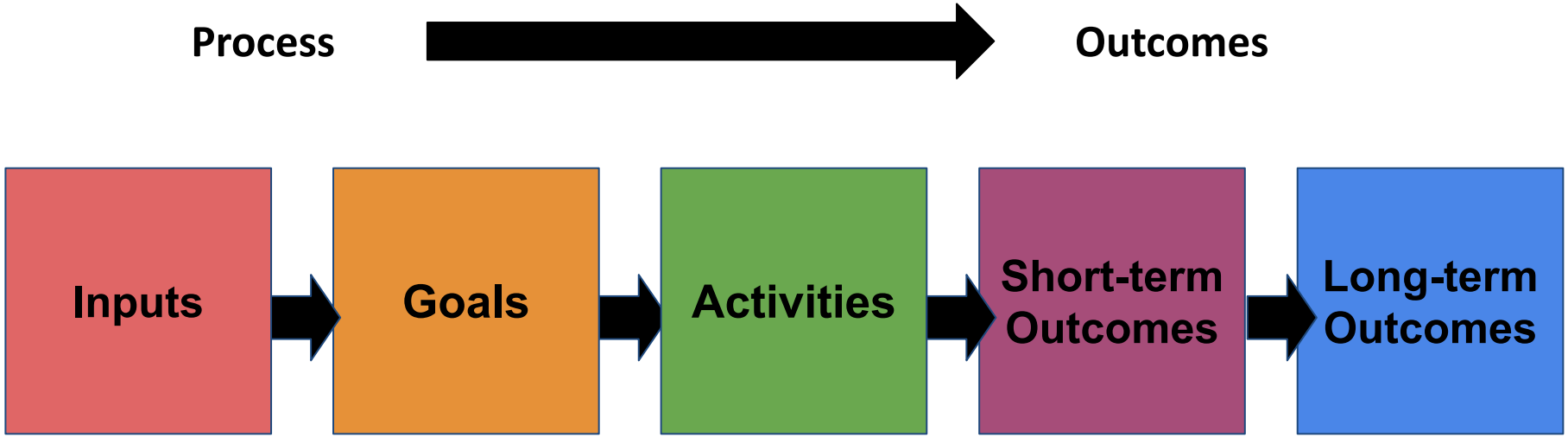
- Logic models
- Survey & focus group questions
- Validated survey instruments
- Assessment rubrics

Logic Models are a Tool to Help you Build an Effective Training Program

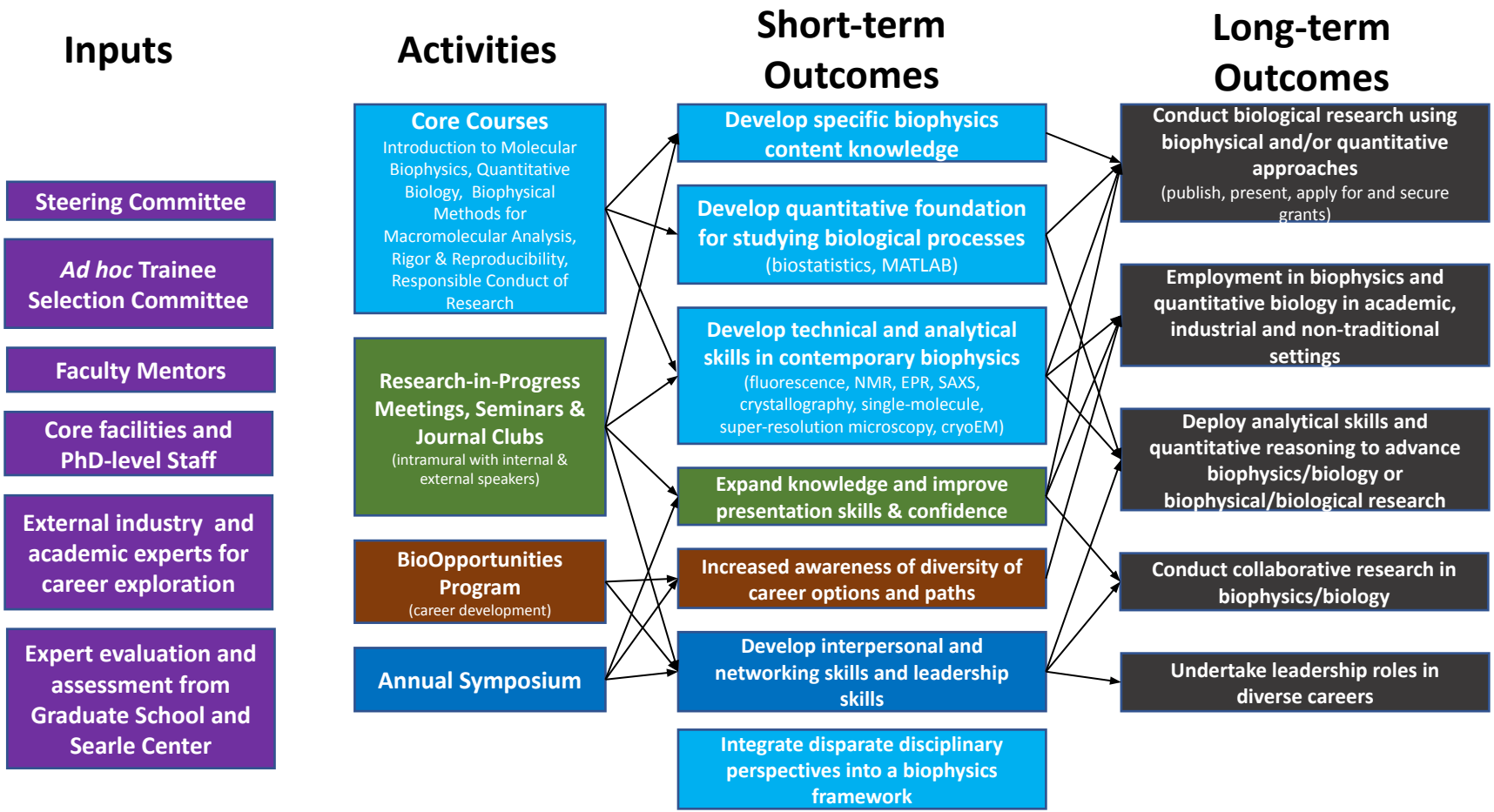
- A program that's cohesive and effective

- An evaluation plan that will help you know how to improve your program

Program Logic Model



Inputs	Goals	Activities	Short-term outcomes	Long-term outcomes and impacts
Faculty Facilities Infrastructure Program Support Expert partners Research collaborators	Program Specific Trainee knowledge, skills. behaviors	Curriculum; courses; bootcamp; labs	Learning from course work; specific skills, conceptual foundations	Interdisciplinary research capabilities
	Generic Trainee Research Skills	Mentoring; seminars; conferences	Self-efficacy and confidence in research; scholarly output	Scholarly output; academic and non-academic research career placement
	Trainee Professional Skills	Communications experiences; teaching experience	Agency and skill in oral and written communication	Excellent communicator, leader, teacher, and researcher
	Diversity and Inclusion	DEI workshops; recruitment; affinity groups	Awareness, knowledge, strategies for creating inclusion	Leads and advocates for equity and inclusion in lab, department, & school



Biophysics Training Program, Northwestern University, Prof. Ishwar Radhakrishnan

Connecting and aligning

- Consider what activities are aligned with which goals and outcomes
- Use arrows and colors to make alignment clear

Activity - build a logic model

Individually: Using the worksheet, sketch out a draft logic model for your program

- Focus on your ***specific outcomes*** for trainees
- Include at least ***one program specific*** and ***one general***

Then, we will put you in groups - share your logic model

Activity Debrief

What were the challenges of constructing the logic model?

What did you learn from others?

What questions do you have?

What are your next steps?

What concerns do you have about logic models?

Critique of Logic Models

- Imply linear (uni-directional) relationships
- Reductionist
- Messy and confusing
- Imply causal relationships
- Don’t address synergistic effects
- Can encourage program design that focuses on inputs and activities

Resources

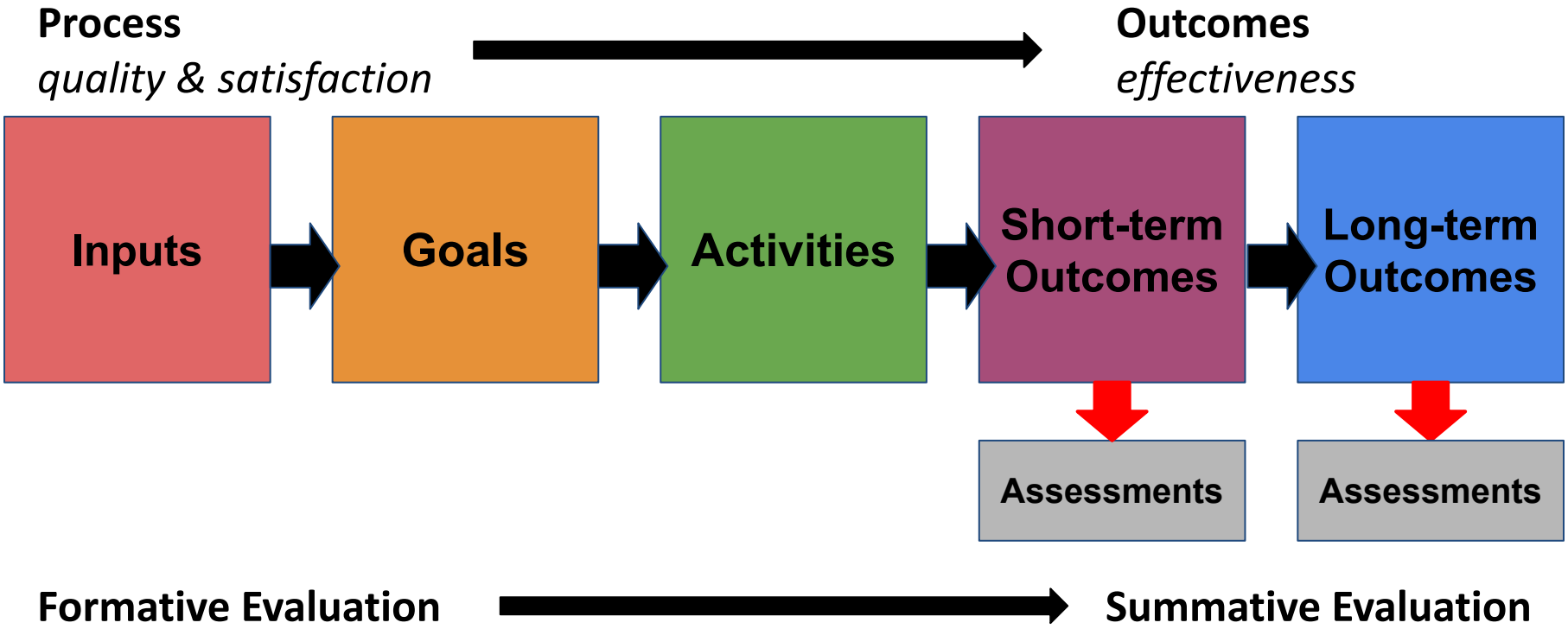
Logic model examples from NU T32's

Logic model templates

https://canvas.northwestern.edu/courses/126960

Using Logic Models for Assessment & Evaluation

Using a Logic Model for Evaluation



Summative Evaluation of Trainee Outcomes

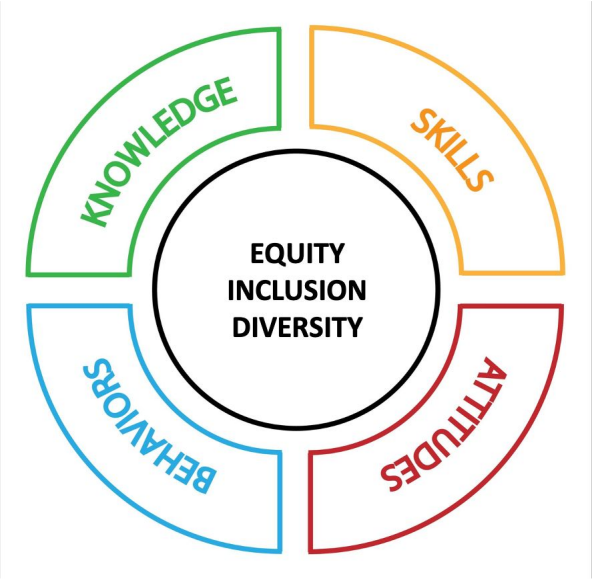
Levels of Evidence – Trainee Outcomes

- Third party assesses work products using an assessment rubric, or conducts oral examination
- Trainee provides annotated examples of work products
- Self-report about skills/knowledge on validated survey instrument
- Self-report about skills/knowledge on a survey that has not been validated

Centering equity and inclusion in evaluation

Applying culturally aware evaluation principles

- self-reflection of our own identity, power and positionality as evaluators;
- ensuring diversity of perspectives and lived-experience on all our stakeholder groups;
- engaging multiple voices in planning, implementing, interpreting, and decision making;
- taking a critical consciousness lens to our work.



(CDC, Frierson, Hood)

Example of Program Specific Survey Questions

1) I have learned about fundamental concepts and principles of thermodynamics, kinetics, and transport processes as they relate to macromolecular systems.
2) I have learned about fundamental concepts and principles relating to macromolecular structure, function, and dynamics on a variety of length and time scales and how they impact on the behavior of cells.
3) I have learned how to connect experimental data with mathematical models.
4) I have broadened my knowledge of biophysical methods to answer critical biological questions.

Interdisciplinary Skills Assessment: Research Orientation Scale

Please indicate how strongly you agree or disagree with each of the following statements (scale: strongly disagree, somewhat disagree, neutral, somewhat agree, strongly agree)

a) I tend to be more productive working on my own research projects than working as a member of a collaborative research team.
b) There is so much work to be done within my field that it is important to focus my research efforts with others in my own discipline.
c) The research questions I am often interested in generally do not warrant collaboration from other disciplines.
d) While working on a research project within my discipline, I sometimes feel it is important to seek the perspective of other disciplines when trying to answer particular parts of my research question.
e) Although I rely primarily on knowledge from my primary field of interest, I usually work interactively with colleagues from other disciplines to address a research problem.
f) The benefits of collaboration among scientists from different disciplines usually outweigh the inconveniences and costs of such work.
g) In my collaborations with others I integrate research methods from different disciplines.
h) In my own work, I typically incorporate perspectives from disciplinary orientations that are different from my own.
i) Although I was trained in a particular discipline, I devote much of my time to understanding other disciplines in order to inform my research.
j) In my collaborations with others I integrate theories and models from different disciplines.

Research Orientation Scale; Rosenfeld,1992

Interdisciplinary Skills Assessment: Collaborative Activities Scale

Please assess the frequency with which you typically engage in each of the activities listed below (Referring to <u>ALL</u> of your professional activities): (scale: rarely, never, once a year, twice a year, quarterly, monthly, weekly)

a) Read journals or publications outside of your primary field

b) Attend meetings or conferences outside of your primary field

c) Participate in working groups or committees with the intent to integrate ideas with other participants

d) Obtain new insights into your own work through discussion with colleagues who come from different fields or disciplinary orientations

e) Modify your own work or research agenda as a result of discussions with colleagues who come from different fields or disciplinary orientations

f) Establish links with colleagues from different fields or disciplinary orientations that have led to or may lead to future collaborative work

Hall et al 2008

U Chicago MSTP Thesis Committee Meeting Assessment

	N/A	4	3	2	1
Deep Knowledge of Research Specialization	☐	☐	☐	☐	☐
Deep knowledge of (a) historical context; (b) current content expertise; and (c) tools & approaches relative to field.					
Critical Thinking Skills	☐	☐	☐	☐	☐
Demonstration of (a) recognizing important research questions; (b) designing a single experiment (answer questions, controls, etc.); (c) interpreting data; and (d) designing a research program.					
Experimental Skills	☐	☐	☐	☐	☐
Identifying appropriate experimental protocols, designing and executing protocols, troubleshooting, lab safety, data management.					
Computational Skills	☐	☐	☐	☐	☐
Extent of skills regarding relevant statistical analysis methods and bioinformatics literacy.					
Communication Skills	☐	☐	☐	☐	☐
Oral and written communication skills; communication with different stakeholders (e.g., committee v. peers v. other experts in field such as at a national conference).					
Management Skills	☐	☐	☐	☐	☐
The extent to which the trainee demonstrates skills in (a) organization & planning; (b) decision-making; (c) problem-solving; and (g) conflict management—whether related to their project and/or the lab environment as a whole.					

*4 = Developing, Room for growth; 3 = Advanced, Skills are sufficient to support a strong project; 2 = Independent, Skills meet committee expectations for a trainee who is ready or nearly ready to graduate; 1 = Exceeds Expectations, Skillsets exceed expectations for a PhD trainee—on par with early career scientists

Computational Skills Assessment Rubric

COMPUTATIONAL SKILLS: *The extent to which the trainee is skilled in (a)* ***basic statistical analysis****; and (b)* ***bioinformatics literacy****.*

COMPUTATIONAL SKILLS			
MILESTONES			
Developing (4)	**Advanced (3)**	**Independent (2)**	**Exceeds Expectations (1)**
• Understands different data types & how that informs test choice. • Can generate & graph basic summary statistics from original data • Understands the basics tenets & paradigms of genome biology including awareness of the complexity of information storage in biological systems. • Can describe the cross-disciplinary nature of bioinformatics & locate appropriate data repositories	• Selects appropriate statistical test & design experimental data collection to support ultimate statistical analysis in consultation with statistics expert to ensure proper choices • Uses appropriate software tools • Recognizes when large-scale data-intensive biological problems are bioinformatics problems • Seeks expert support to determine appropriate analysis • Performs basic data queries in public database	• Independently selects appropriate statistical test &design experimental data collection to support ultimate statistical analysis • Recognizes when additional statistical consultation is necessary • Uses appropriate databases, software tools, & algorithms relevant to research projects • Identifies appropriate resources & experts to develop solutions to complex bioinformatics problems	• Teach trainees the value of statistical consultation • Guides trainees in choosing appropriate statistical tests & experimental designs in their research fields • Assists newer lab members in the conceptualization of bioinformatics problems

Some Sources of Evidence

- *Research in Progress Meetings*
- *Work products from courses*
  - assignments, projects, exams, peer review work
- *IRB Submissions*
- *Grant Proposals*
- *Publications*
- *Conference Proposals, Presentations & Posters*
- *Thesis & thesis defense meetings*

Assessment Activity

In small groups,

Identify some appropriate assessments for two of your program specific goals for trainees

Assessment Activity Debrief

Please share some examples of the assessments that you developed.

Share the outcome you want to assess and how you are going to assess it.

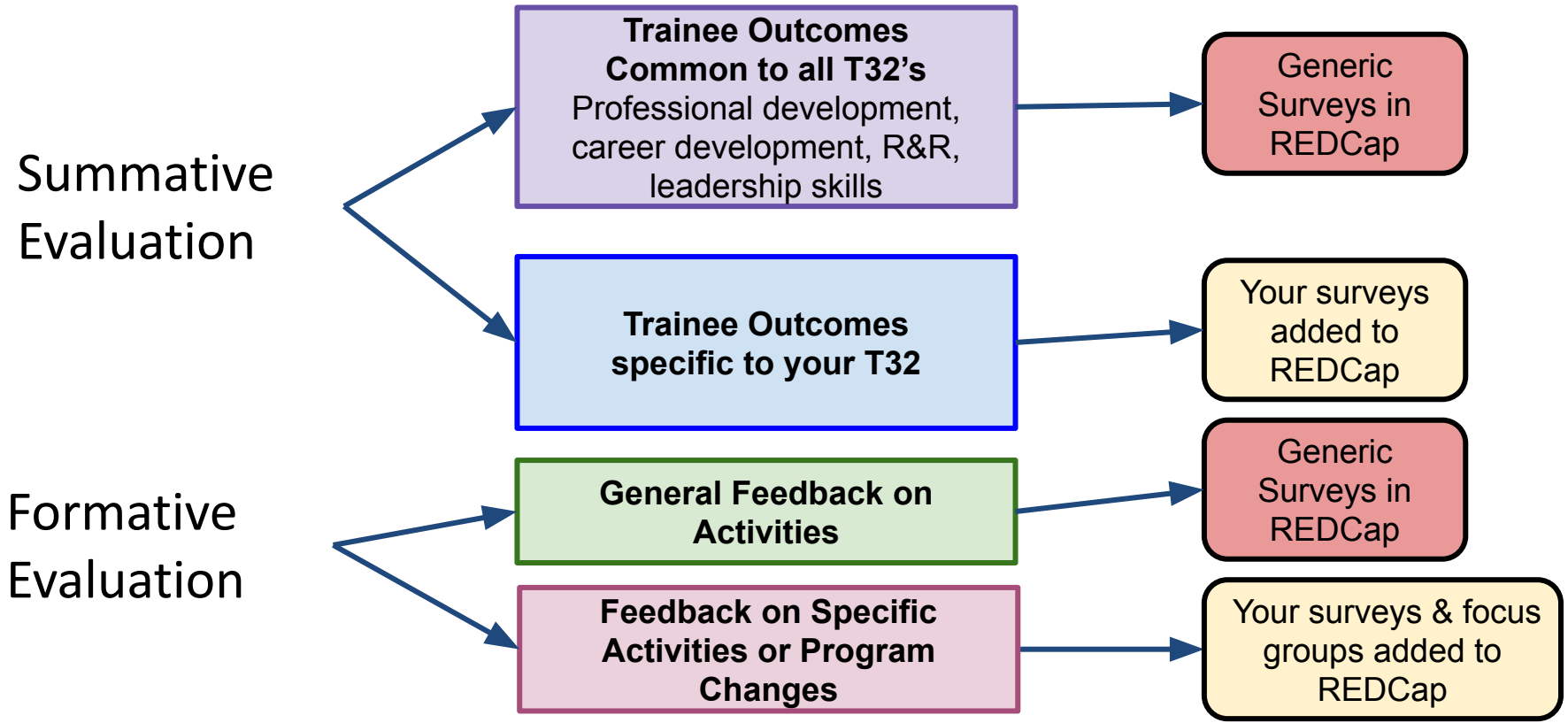
Focus Groups

Positives	Negatives
Efficient	Not good for exploring sensitive topics
Good for exploring reactions to program changes	Takes time to organize and attend
Interaction between participants leads to novel ideas	Analysis takes longer than surveys
Participants often enjoy them	“Group think” can occur

Surveys

Positives	Negatives
Efficient Quick analysis Inexpensive Anonymity can bring more honesty	Answers to open-ended questions tend to be brief Risk of survey fatigue

NU T32 Evaluation Framework




Q&A