

# **HOW TO APPLY THE MULTIPHASE OPTIMIZATION STRATEGY (MOST) IN YOUR INTERVENTION DEVELOPMENT RESEARCH**

## **Module 3 Introduction to the optimization trial**

### **Lesson 1: Importance of the resource management principle**



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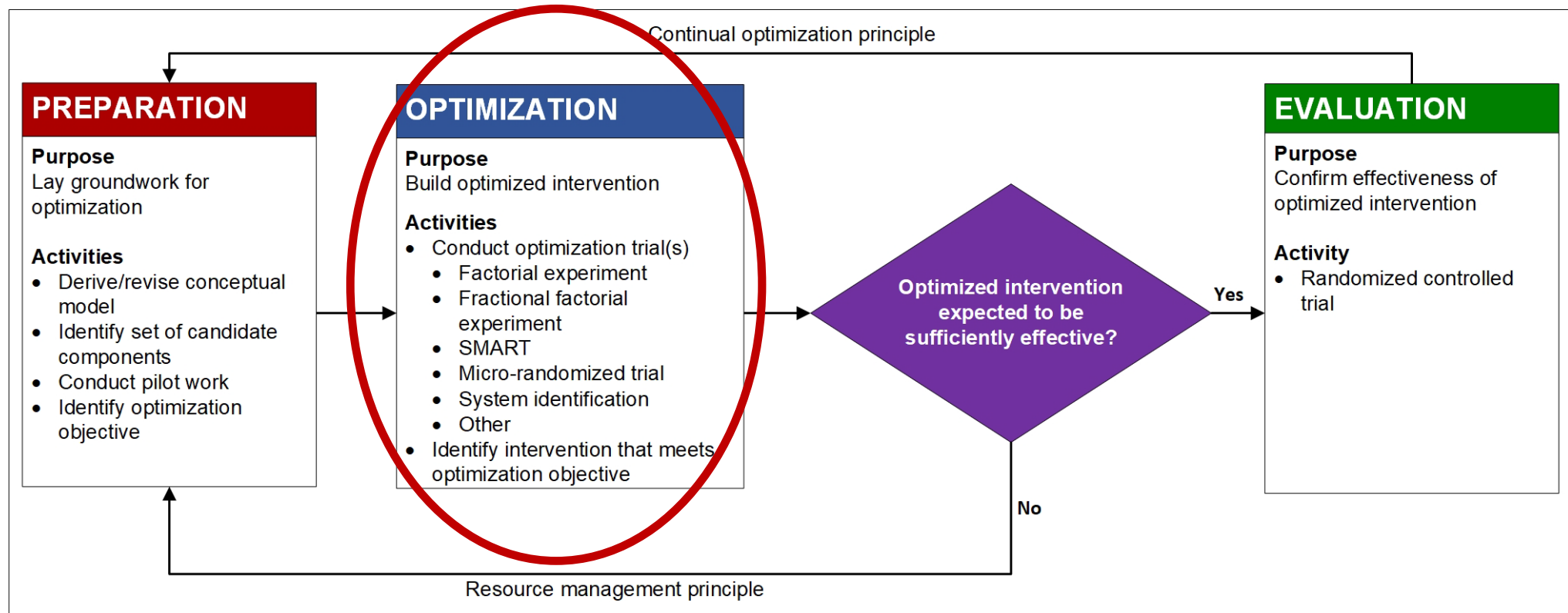
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**Flow chart of the three phases of the multiphase optimization strategy (MOST). Rectangle = action. Diamond = decision.**

Figure adapted from Collins, L.M. (2018)

# In this lesson you will learn how to:

- Recognize the importance of basing the selection of an optimization trial design on the resource management principle.



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# Why conduct an optimization trial?

- Objective: efficient assessment of intervention components

# Why conduct an optimization trial?

- You might want to
  - Weed out underperforming components
  - Get a sense of magnitude of each component's effect
  - Examine whether effect of a component is augmented or reduced in presence of another

# Why conduct an optimization trial?

- This information is then used to select components/component levels to optimize the intervention...
- ...and thereby achieve intervention ***EASE***.

# Intervention *EASE*: A strategic balance of the desiderata for multicomponent interventions

*EASE* is achieved by BALANCING

AGAINST

Effectiveness



*A*ffordability

*S*calability

*E*fficiency



# Choice of design for optimization trial is critical

- Any experimental design is a possibility BUT...
- **...must be selected based on Resource Management Principle!!!**

# Review: Resource management principle

- In Module 1 you learned:
  - An investigator using MOST must strive to make the best and most efficient use of available resources when obtaining scientific information
- ANY experimental design is OK as long as it is the most efficient one

# **The most efficient design for an optimization trial is the one that...**

- ...best manages research resources
  - We will be discussing this soon
- ...most directly addresses the primary research questions
  - This depends partly on the type of intervention to be optimized – we will discuss this later in this module

# **Developing an intervention aimed at reducing viral load among HIV+ heavy drinkers**

## Candidate components:

1. Motivational interviewing (no, yes)
2. Peer mentoring (no, yes)
3. Text message support (no, yes)
4. Mindfulness meditation (no, yes)
5. Behavioral skills training (low intensity, high intensity)

- We are going to use this as an example throughout this module.
- Please note that sometimes we may use a subset of the candidate components to illustrate different points.

# Resource management principle

- Logic: huge (e.g., 32-arm) RCT would (in theory) be definitive, but is not feasible to power

# Resource management principle

- Instead, manage research resources strategically to:
  - Gain the most information
  - Gain the most reliable information
  - Move intervention science forward fastest

# Resource management principle

- Decide what information most important, and target resources there
- Choose design most appropriate for type of intervention being optimized
- Choose design for efficiency



# Resource management principle

- Note that the starting point is the resources you have (or can reasonably apply for)
- By definition, MOST does not require an increase in research resources
- But in most cases will require a *realignment* of research resources

# Groundwork before selecting an experimental design

- OBJECTIVE: To gather information that will be used in decision making
- Need as much practical information as possible
- STARTING POINT: What decisions do I need to make?

# **Developing an intervention aimed at reducing viral load among HIV+ heavy drinkers**

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# Decisions to be made for candidate components 1—4

- Does the component have a detectable effect (does the yes level outperform the no level)?
  - If effect is detected, consider including in intervention package
  - Depending on optimization objective, this may be reconsidered in relation to cost, time, etc.
  - If no effect is detected, the component is not included

# Decisions to be made for behavioral skills training component

- Does high intensity outperform low intensity?
  - If high intensity  $>$  low, consider selecting high intensity
  - Depending on optimization objective, this may be reconsidered in relation to cost, time, etc.
  - If high intensity NOT  $>$  low intensity, select low

# **So here is what we want to find out:**

- For each component, determine whether there is a difference between the higher and lower levels
- Ideally, determine whether components interact
- This information to be used in making decisions about selection of components and levels for intervention package

# **The resource management principle says:**

- The investigator must carefully choose an experimental design so as to
  - Gather the information needed...
  - ...while making the most of (but not exceeding) the available resources

# The resource management principle says:

- Thus the experimenter must
  - Have a clearly specified set of research questions
  - Know what resources are available
  - Know what resources are required by each experimental design under consideration
    - Different designs require different resources



# The resource management principle says:

- To select an experimental design, consider several, and examine
  - The scientific information each will provide
    - And whether it is what you want!
  - What each design costs
    - Number of subjects
    - Number of experimental conditions

# **The resource management principle says...**

- NOTE that the starting point is the resources you have (or can reasonably apply for)

# **In this course we are emphasizing the factorial optimization trial**

- The most widely applicable optimization trial
- Often the most efficient
- Most (but not all) other optimization trial designs are rooted in factorial experiment

# In this lesson you learned how to:

- Recognize the importance of basing the selection of an optimization trial design on the resource management principle.



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# In the next lesson you will learn how to:

- Describe the factorial experiment and what it is intended to estimate: main effects and interactions.
- Recognize that coding can have implications for interpretations of results.

