

# Defining What Tailoring, Scaling and Progressive Elaboration Plans Mean to All Lifecycle Phases

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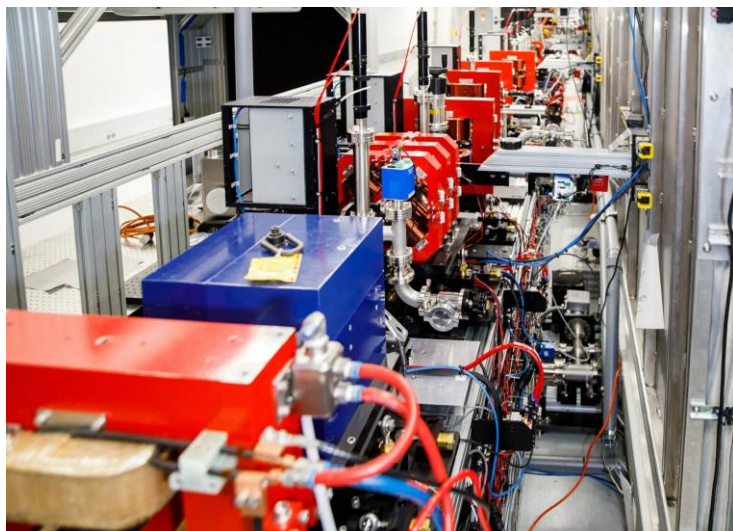
# Introduction

**All RI management plans need to address standard questions about how work will be managed and controlled, but...**

**There is no one standard set of answers to those questions:**

- Formal processes and advanced tools are required to manage the complexities of large, complex projects
- Small, simple projects are well-served by simple processes and tools

**Management approaches should be as varied and as unique as the individual work efforts**



CXFEL – Mid-scale Facility



DKIST – Major Facility

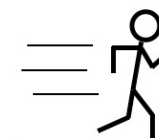
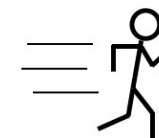
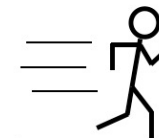
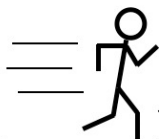
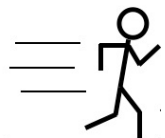
**Tailoring, Scaling, and Progressive Elaboration are the means to achieve appropriate management approaches:**

- Ability to select (tailor) and adjust (scale) management methodologies based on characteristics of the work effort
- Allow planning to develop and mature over time
- Aid in establishing the appropriate level of NSF oversight



# Definitions

This will be covered



## Sequence is important: Order of employing

**Tailoring:** Selecting a project's framework to define and organize the scope, organization, schedule, cost detail, and management processes according to requirements and work type

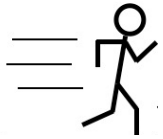
**Scaling:** Adjusting the level of detail and degree of formality in the tools and management processes to match the characteristics of the planned work and the implementation processes

**Progressive Elaboration:** Iteratively increasing the maturity of life-cycle management plans as planning advances and details become clearer

*Note: Material is in the current RIG but is distributed.  
Will be reorganized and clarified in the upcoming RIG revision*



# Tailoring – Life Cycle Stage & Planned Work Type

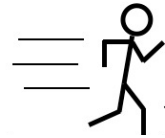


## Select the project framework that matches Stage and Type

- Solicitation requirements, if applicable, vary with circumstances
- Life Cycle Stage – RIG defines required management plan elements
  - Design – Design Execution Plan (DEP)
  - Execution – Project Execution Plan (PEP)
  - Operations – Strategic and Annual Work Plans
  - Disposition – Disposition Plan
- Work Type – defines framework for organizing scope and setting up an organization
  - Sequenced Products/Deliverables – Traditional (designs, facilities, equipment, etc.)
  - Cyclical progression – agile (IT, development, prototyping, commissioning, etc.)
  - Functional Services (contracts, level-of-effort (LOE) management, operations)
  - Hybrid – mix of several types (e.g. traditional, LOE management & business services, agile IT)



# Scaling – Match Project Characteristics



## Determine/adjust the appropriate level of formality and detail

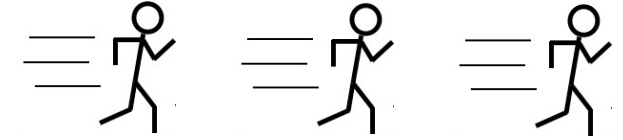
- Assess project characteristics
  - Project scale: budget and duration, how many deliverables
  - Project complexity: many partners, many interfaces, complex processes and logistics
  - Risk level: known vs. groundbreaking technologies, schedule constraints, market volatility
  - Organization: institutional/cultural factors, existing processes, project team experience
- Decide on level of detail
  - Number of levels in WBS and number of control accounts
  - Scope of work determines level of detail in schedule
- Set management processes and tools to match characteristics
  - Formality of process and sophistication tools increases with project complexity and risk

*(Note: Solicitation and life cycle stage tailoring requirements may limit ability to scale)*



# Progressive Elaboration – From Initial to Mature Plans

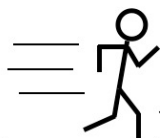
## Progress from high-level, initial plans to detailed, mature plans



- Initial planning is typically high level
  - High level requirements
  - High level WBS and schedule (maybe level 2 or 3)
  - Top-down cost estimates
  - Rough outlines of processes and plans; risk assessment
- Plans mature as implementation nears
  - Final requirements down to engineering level
  - Detailed WBS and dictionary and scope management plans
  - Bottom-up budget estimates with GAO-compliant Basis of Estimates
  - Detailed schedule, time-phased budget
  - Management plans and processes complete
- Some planning reaches maturity after implementation begins
  - WBS planning packages detailed into work packages
  - Detailed QA/QC plans following defined process
  - Commissioning plans informed by testing



# Example: Construction Project (Build facility ~\$300M)



## Tailoring

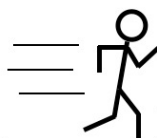
**Life Cycle Stage:** Construction

**Category:** Major Facility, complex, high risk

**Required:** All Project Execution Plan (PEP) components, plus

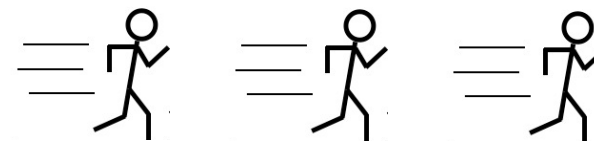
- Integrated Project Schedule (IPS) – loaded with costs and resources
- Cost and schedule Monte Carlo Risk Analysis on IPS and time-phased budget
- Verified EVM for performance management
- Any specific NSF requirements

**Project Type:** Hybrid with functional PM services and traditional sequenced construction of deliverables



## Scaling

- WBS: traditional for construction to level 5
- Schedule IPS in commercial software – hire schedulers
- Choose MC software that handles combined cost-schedule – hire experienced Risk Manager
- Use EVM software in scheduling applications
- Rigorous Change Control process: CCB, request forms, tiered approval hierarchy, and logging of changes

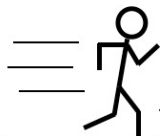


## Progressive Elaboration

- **CD:** High level WBS, key scientific objectives, top-down costs, key milestones, qualitative risk analysis, sketches of PEP components
- **PD:** Mature WBS, engineering reqs, total cost and schedule, risk and contingency, most work packages defined, all PEP components and processes addressed
- **Execution:** Specific QA/QC plans, testing plans, commissioning, rolling wave planning packages detailed out



# Example: Mid-Scale Design Project (Facility upgrade ~\$6M)



## Tailoring

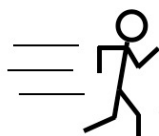
**Life Cycle Stage:** Design

**Category:** Simple, low complexity

**Required:** Solicitation req's

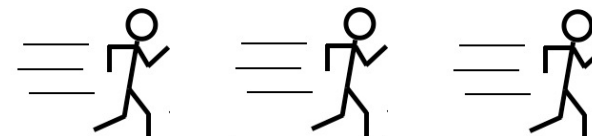
- Design Execution Plan (DEP) with minimum applicable sub-components (PEP-Lite)
- PMM required (EVM not required)
- DEP details at project discretion

**Project Type:** Traditional sequence with defined deliverables (facility PEP and construction documents)



## Scaling

- WBS and Organization; level 3, traditional
- Milestone list with metrics
- Budget: level-of-effort, materials and supplies
- Risk register and simple analysis for contingency
- Performance tracking: cost and milestones spreadsheets against actual costs and dates
- PM manages Change Control with Change with log



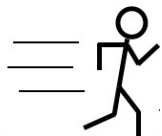
## Progressive Elaboration

- **Pre-proposal:** High level WBS, key scientific objectives, top-down costs, major milestones, qualitative risk analysis, sketches of DEP
- **Proposal:** Mature WBS, requirements, total cost and schedule, risk and contingency, all applicable DEP components and solicitations terms addressed
- **Execution:** Specific review and design validation plans; rolling wave planning packages detailed out





# Example: Operations (Maintenance and Ops ~\$12M/yr)



## Tailoring

**Life Cycle Stage:** Operations

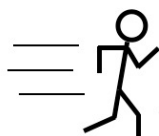
**Category:** simple, low complexity

**Required:** Strategic (multi-year) & Annual Work Plans

- WBS and related budget
- O&M Plan: Organizational structure and management plan
- Performance evaluation plan against milestones, targets, and goals
- Risk analysis plan
- Facility Condition Assessment (if a major facility)

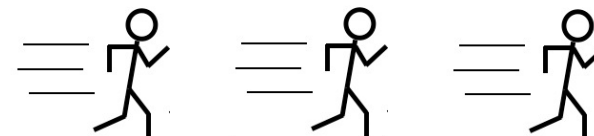
**Project Type:** Functional WBS and Organization

- operations
- maintenance
- data management
- science support
- outreach



## Scaling

- Functional WBS and Organization; 2-3 levels
- List of target/goals with milestones and metrics for performance tracking - spreadsheets
- Budget tied to WBS (Level-of-Effort salaries plus maintenance allowances)
- Change Control log
- Risk register and qualitative ranking
- scope contingency only



## Progressive Elaboration

- **Proposal:** Mature Strategic Plan – high level mission, goals, organization; mature management plans; high level annual work plans
- **Award Period:** Detailed Annual Work Plans
- **~ 5 years:** Facility Condition Assessment (FCA) on routine refurbishment and renewal as well as potential facility upgrades



# Summary

- **Highlights of Tailoring, Scaling, and Progressive Elaboration**
  - Varying management approaches are needed to fit different RI types and Life Cycle Stages
  - Tailoring selects the overall management approach
    - Follow NSF requirements from Solicitation and RIG Life Cycle Stage
    - Determine work type to set management framework
  - Scaling adjusts to the right level of management detail and formality
    - Match characteristics of work and organization
  - Progressive Elaboration means plans develop as understanding matures
- **Practical considerations**
  - Plans must meet both project needs and NSF requirements
  - Solutions must be appropriate and justified
- **Benefits to NSF and managers**
  - Adjusts administrative burden to match needs
  - Allows use of appropriate (and sometimes familiar) processes and tools
  - Improves communication between project and stakeholders
  - Maintains proper level of rigor and formality for NSF oversight

**‘TSPE’ allow each awardee and proposer to develop unique solutions that address similar questions about how work will be organized and managed**



# Questions?

The draft of RIG section 3.2 TAILORING, SCALING, AND PROGRESSIVELY ELABORATING has been posted for review and comments by individual Workshop attendees