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***NCAT EA Training:  
PM Team draft-revised charts***

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# *Section Objectives*

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- Underscore need for PM community to pay attention to and embrace EA as an acquisition strategy
- Identify the impacts a PM will face: this provides full and open disclosure
- Point to resources that serve as enablers in the pursuit of EA/SD
- Reference key benefits of EA approach

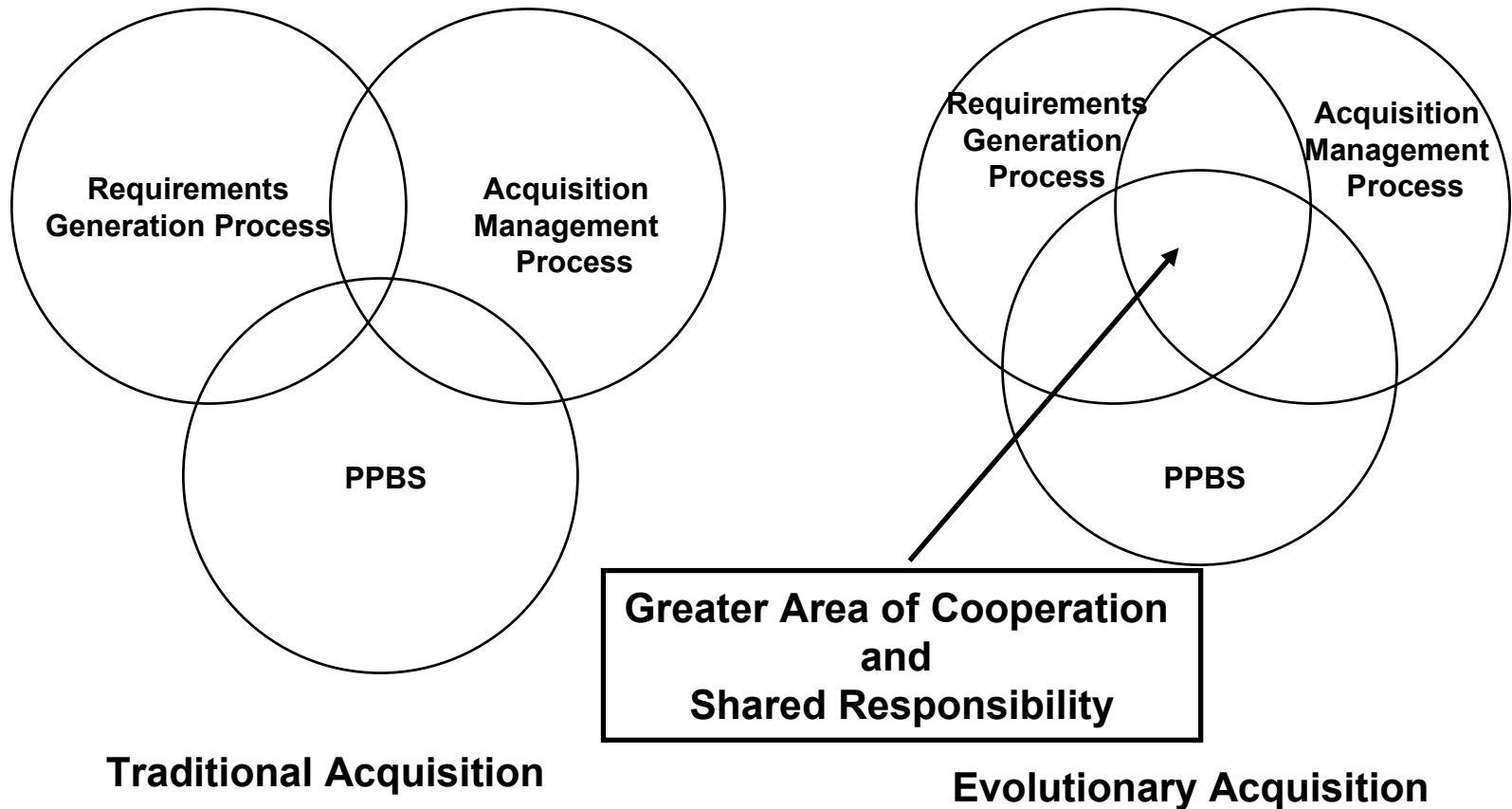
# *The Big Picture: Traditional System vs Evolutionary Strategy*

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- Serial, “big-bang” solution drives cycle time
- Difficult to adjust requirements to reflect asymmetric threats or warfighter “use and learn” experience
- Collaboration among various players is weak (users, acquirers, testers, industry, etc.)
- Technology reach too long and process lacks flexibility for timely insertion
- Too much time for things to go wrong (budget instability, schedule changes, cost increases, etc.)
- An incremental development strategy
- More than one flavor of evolutionary acquisition strategy
  - Pre-planned product improvements
  - Block upgrades
  - Spiral development process
- Spiral development differs from others
  - Each spiral yields less than 100% solution (except the last)
  - Spiral content driven by schedule, funding and technology maturity
  - Requirements evolve from user learning
  - Spirals contain only fully mature technology
  - Each development spiral typically shorter
  - Spirals can apply to new, upgrades to legacy systems, etc.

# ***EA IMPACT ON THE PROGRAM MANAGER***

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# *Moving towards an EA strategy...*

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- **PM must focus on:**
  - Requirements
  - Testing
  - Training & Logistics
  - Ensuring the use of a building-block-type Systems Engineering Process
  - A clear vision for objective capability

*When implementing an EA Strategy, the PM must look at the 'deltas' (i.e. those key areas of difference) and determine how best to keep the new processes in these 'delta' areas on track*

# ***EA IMPACTS ON THE PROGRAM MANAGER***

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- MDA decisions will cover a potentially much broader scope than before
  - That means a lot more PMO work preparing for them, and a new layer of meaning for all involved
- If we are serious about committing resources to a particular program, we have to be serious about doing these programs right—being patient when it is required, but conversely demanding performance when it is appropriate.
- Some activities may have to get used to dealing with less complete data upon which to base their decisions.

# ***EA IMPACTS ON THE PROGRAM MANAGER***

## ***(continued)***

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- We may accomplish a smaller number of programs simultaneously in order to make the commitment necessary for the programs we choose to pursue.
  - Increased Training and Logistics
    - Each fielded block needs associated training and logistics support
    - Additional funding must be requested, appropriated, and maintained
  - Overlapping development ... two or three blocks at various stages of development & fielding at all times
    - Requires more PMO resources, particularly people
    - More complex, harder for one PM to manage
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# *EA Attributes for PM*

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- **PM IPT involvement shortly after Milestone A**
  - Early Establishment of EA/SD Blocks systems acquisition strategy
  - Early management of technology development/requirements tradeoffs
  - Early management of building block systems engineering IPT process
  - Program(s) budgets and schedules determined concurrently with the acquisition strategies
- **ORD contains time-phased requirements including end state vision**
  - Total IPT involved in both requirements and acquisition strategy
  - Continuously reiterate requirements, cost and schedule at key milestones throughout life cycle
- **Cost (affordability) and schedule viewed in same way as performance requirements**
  - Need to continuously reiterate potential solutions balancing performance, cost and schedule requirements
  - New methods for budgeting long time and time-phased buckets of different color of money
  - Improved control of costs

*Requires integrated holistic approach throughout life cycle*

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# ***EA Attributes for PM (Continued)***

- **Acquisition strategy includes both technology development, system design, manufacturing, testing and sustainment sub-strategies**
  - Technology development strategy determines what might be needed when and how incorporated
  - Design strategy addresses degree of modularity, robustness, open systems, commonality needed to meet total performance, cost and schedule requirements
  - Manufacturing strategy includes evaluation of manufacturability and producibility to ensure quality and reliability
  - Testing strategy in subsequent blocks only tests what is different and tests to the ORD KPPs
  - Sustainment strategy determines what to do with legacy system blocks and disposal
- **All members of IPTs need to be domain experts for their assigned area**
  - Invest in adequate and timely functional and team training before assigned to PM
  - Provide mix of “gray beards” and “new college trained innovators”
  - Provide opportunities to learn other domain issues to broaden knowledge

***Requires integrated holistic approach throughout life cycle***

# ***EA Systems Engineering Challenges for the PM***

- **Need Building-block Systems Engineering IPT Approach Throughout Product Life Cycle (ANSI/EIA 632 Processes for Engineering a Complex System)**
  - Tiering requirements and solutions from top-level to lowest-level, starting shortly after Milestone A
  - System-of-systems all-inclusive integration approach
  - Design in modularity, commonality, robustness, and open system interfaces to accommodate SD block changes, including all S&T technology development
  - Continuous reiteration of requirements/solutions by total IPT throughout life cycle
  - Continuously reiterate/balance performance, cost and schedule throughout life cycle
- **Ensure Sufficient but Not Redundant Design and Operational Testing**
  - Develop design KPPs for SD increments in accordance with ORD KPPs
  - Involve logisticians and developers early in both requirements and design process
  - Design in prognostics, testability, and supportability requirements
- **Employ Configuration/Data Management and Validate/Verify Results Throughout Every Phase of Acquisition Model**

***Systems Engineering needs to involve total IPT, including industry,  
throughout every phase of Acquisition Model Life Cycle***

# *EA Requirements Challenges*

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- **Requirements Definition**
  - Firm requirements definition still needed for initial block, initial wish list for end-state; subsequent blocks may be defined later
- **Requirements Creep**
  - Influential stakeholders pressure PMs to incorporate added capabilities
  - Engineers' predisposition to incorporate "latest and greatest" technology before mature
- **Deferred Requirements**
  - PMs concerned about funding stability
  - Funding allocated to development blocks without defined requirements is vulnerable to comptroller reprogramming
- **Initial Capability**
  - PMs concerned that users will be content with initial block capability, may frontload lion's share of capability into initial block

# EA Testing Challenges

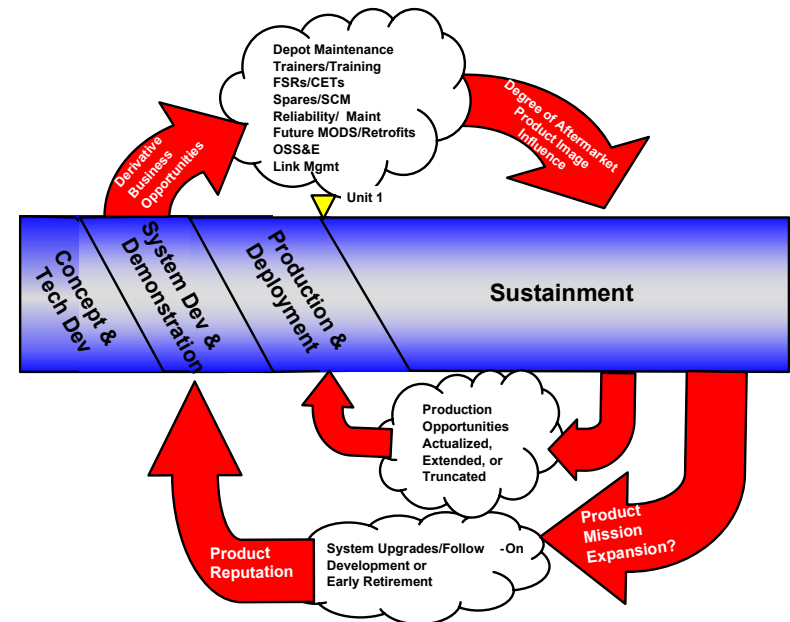
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- **Increased Developmental and Operational Testing**
  - Individual block tests vs. One final exam
  - Additional test funding must be requested, appropriated, and maintained
- **Test Process**
  - Blocks not developed and tested incrementally, avoid “mini-acquisitions”
- **Operational Test Evaluation Criteria**
  - Operational Test Agencies test against the projected threat not ORD KPPs

***To accomplish evolutionary testing, the relationship among the acquisition and test communities is even more critical than in a single-step acquisition. Every effort must be made to foster a close, long-term, working relationship between the developers and testers.***

# EA Training and Logistics Challenges

- **Increased Training and Logistics**
  - Each fielded block needs associated training and logistics support
  - Additional funding must be requested, appropriated, and maintained
  - Logistics capabilities and management practices must be factored into the Systems Engineering Selection Process.
  - **Need to decide whether to support each increment or upgrade all systems to current increment.**



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***Appendix A-  
Models of Evolutionary Acquisition***

# EA Acquisition Strategies - Model 1

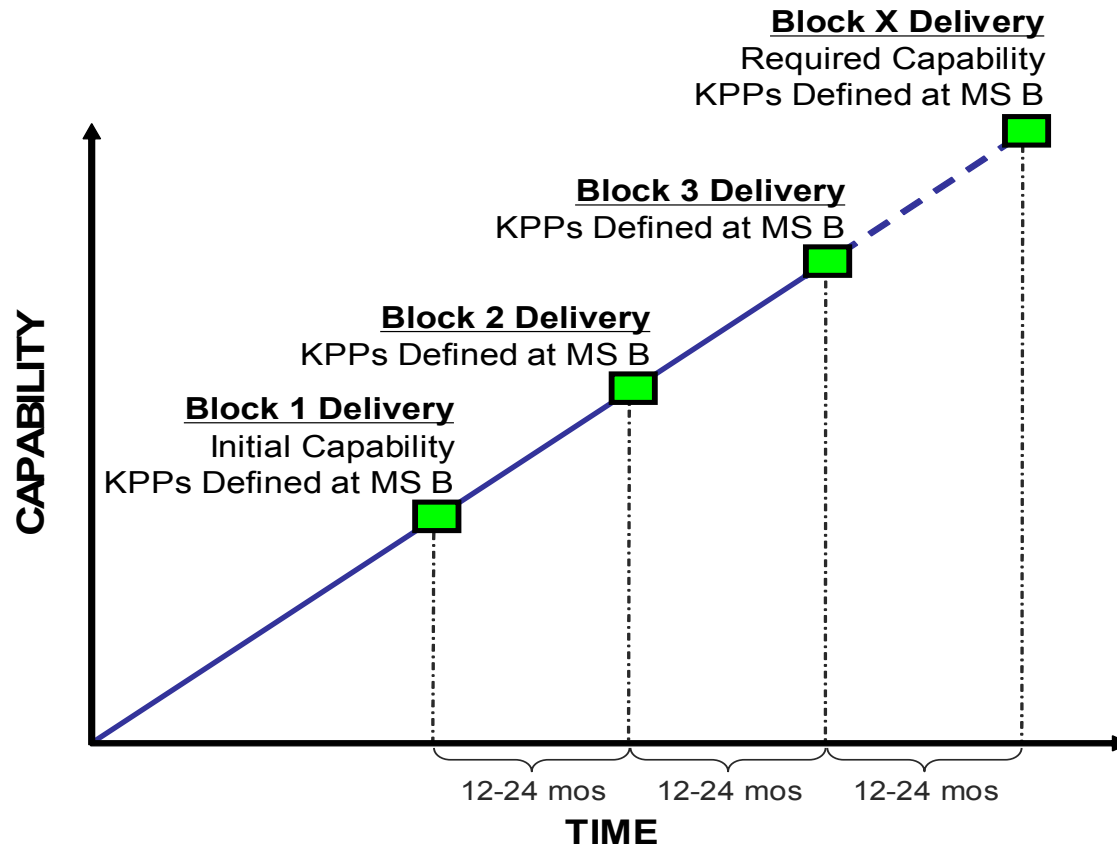


Figure (1): Each block firmly defined at MS B.

# EA Acquisition Strategies - Model 2

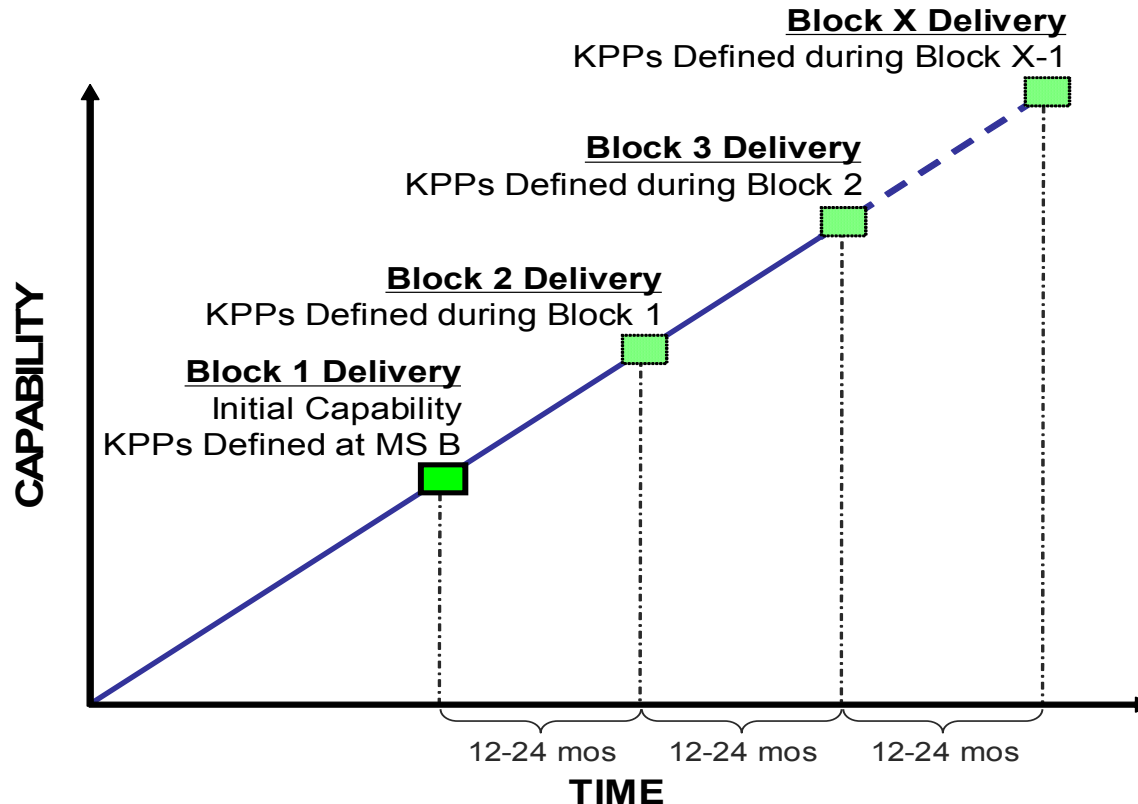


Figure (2). Each block subsequent to Block 1 defined during the development of its predecessor block.

# EA Acquisition Strategies - Model 3

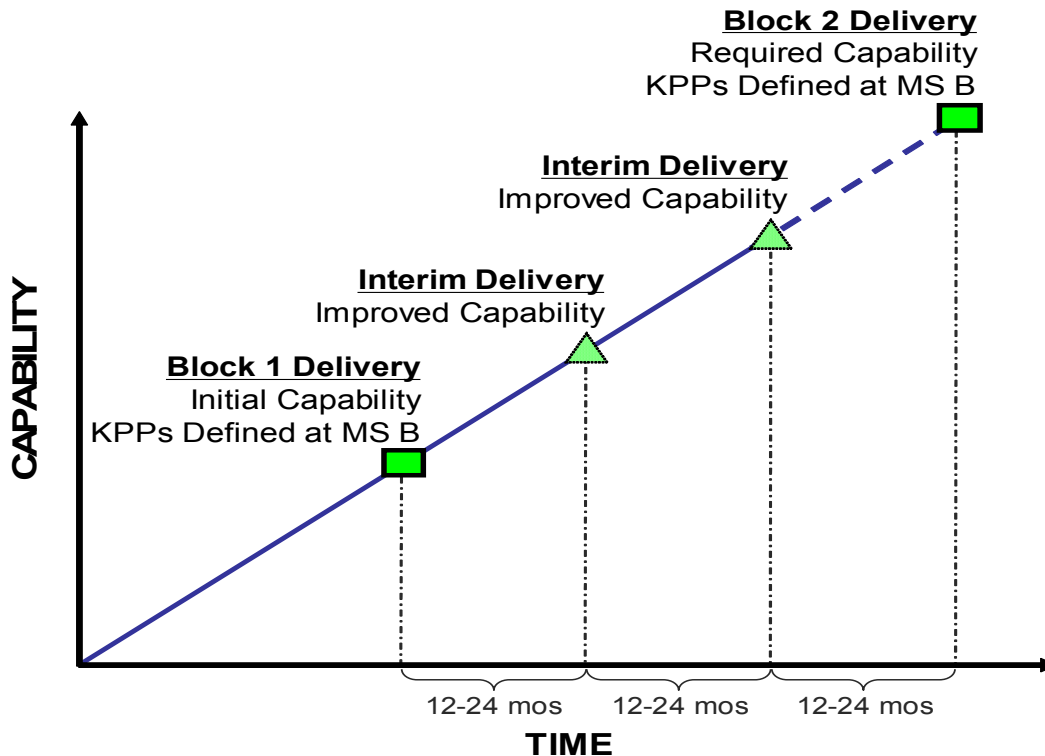


Figure (3). Blocks 1 and 2 defined at MS B, interim improvements fielded at pre-defined time intervals in-between.

# EA Acquisition Strategies - Model 4

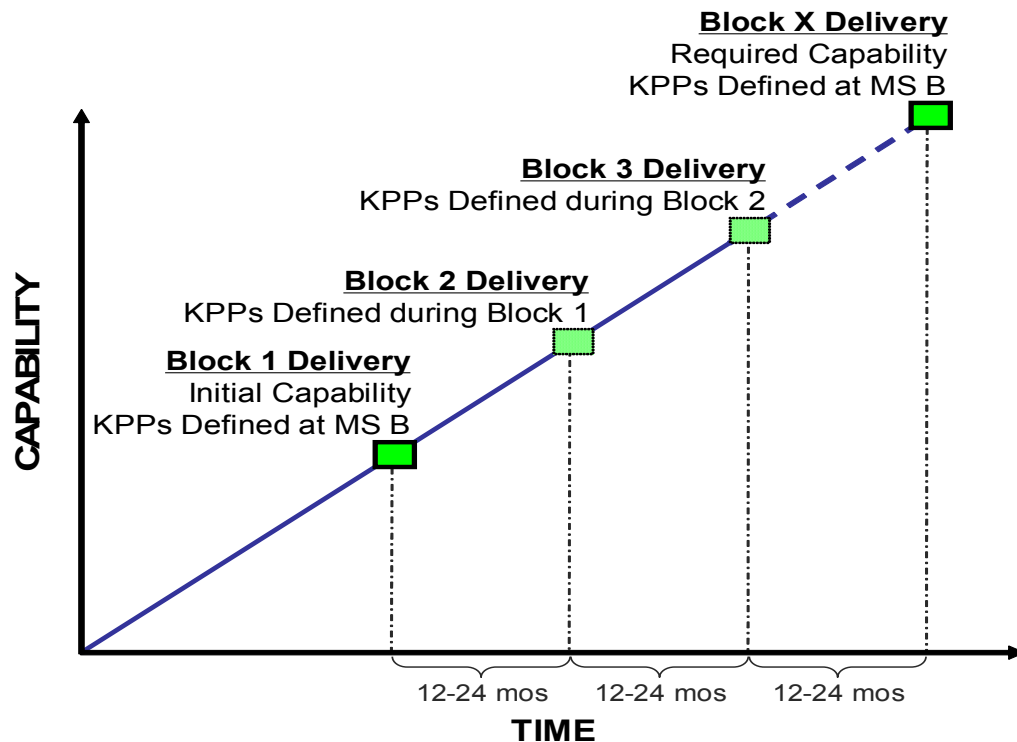


Figure (4). Blocks 1 and 2 defined at MS B, each interim block defined during development its predecessor block.

# EA Acquisition Strategies - Model 5

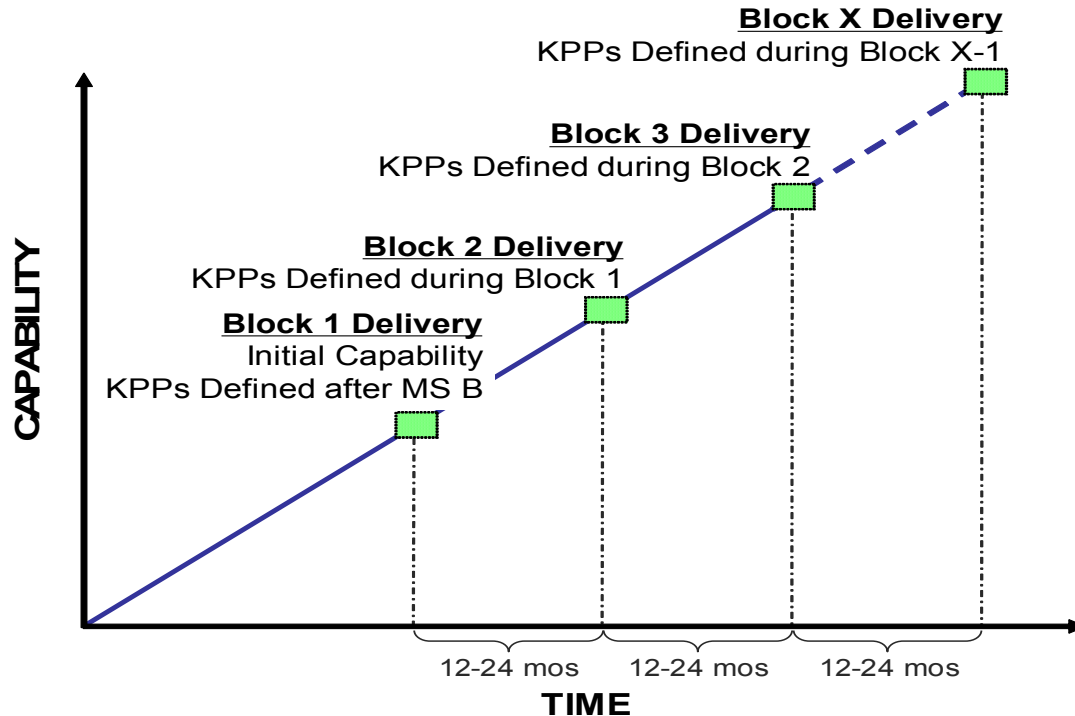


Figure (5). Block 1 defined after MS B, each subsequent block defined during development of its predecessor block.

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***Appendix B-  
Eight Benefits of  
Implementing an EA Strategy***

# ***ONE OF 8 BENEFITS TO IMPLEMENTING AN EVOLUTIONARY ACQUISITION STRATEGY***

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- ***Benefit No. 1:*** Acquisition teams are established early in the process facilitating early development of acquisition strategies, key planning documents, and early identification of potential showstoppers
- ***Accomplished By :*** Bringing key stakeholders together in IPTs shortly following Milestone A
- ***PM Paradigm Shift :***
  - More work scheduled up front in the very beginning of the acquisition process, with acquisition strategies and formal market research taking place much earlier in the process.
  - Acquisition personnel getting more involved in determining requirements; conversely, the users having more to say about acquisition strategy.

## ***TWO OF 8 BENEFITS TO IMPLEMENTING AN EVOLUTIONARY ACQUISITION STRATEGY***

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- ***Benefit No. 2:*** Program budgets and schedules are determined concurrently with the acquisition strategies
- ***Accomplished by:*** Beginning acquisition strategy shortly after Milestone A; early on integrate program budget and schedule into acquisition strategy
- ***PM Paradigm Shift :***
  - More PMO people needed earlier in the program
  - Develop acquisition strategy, program schedule, program budget, and time-phased ORD in parallel

# ***THREE OF 8 BENEFITS TO IMPLEMENTING AN EVOLUTIONARY ACQUISITION STRATEGY***

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- ***Benefit No. 3:*** ORD contains time phased requirements.
- ***Accomplished by:*** Acquisition and requirements communities working together early in the acquisition process; MDA becomes an ORD signatory
- ***PM Paradigm Shift :***
  - Requirements expand to cover cost, performance, schedule, and risk for each block
  - Make commitments to a whole plan involving more than a single round of activity
  - PM must be serious about that to which we are committing
  - Once we set the requirements for a particular increment of activity, they are set. No creeping requirements allowed!
  - Additional PMO resources needed to help develop the ORD
  - Users may front load lion's share of capability into initial block
  - Continuous, short term, hard deadline requirements to meet

# ***FOUR OF 8 BENEFITS TO IMPLEMENTING AN EVOLUTIONARY ACQUISITION STRATEGY***

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- ***Benefit No. 4:*** Schedule and cost are viewed as requirements in the same way as performance requirements
- ***Accomplished by :*** ORD and acquisition strategy being developed simultaneously; both addressing similar cost, schedule, and performance requirements
- ***PM Paradigm Shift :***
  - Much earlier and deeper involvement in the ORD and acquisition development processes
  - More and earlier PMO resources needed

# ***FIVE OF 8 BENEFITS TO IMPLEMENTING AN EVOLUTIONARY ACQUISITION STRATEGY***

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- ***Benefit No. 5:*** Acquisition community and users invested in both requirements and acquisition strategy
- ***Accomplished By:*** Integrating Acquisition Management community into the Requirements Generation Process; make MDA an ORD signatory
- ***PM Paradigm Shift :***
  - Change from 'us and them' to 'we' outlook
  - More cooperation and shared responsibility
  - More PMO people needed earlier in the program

## ***SIX OF 8 BENEFITS TO IMPLEMENTING AN EVOLUTIONARY ACQUISITION STRATEGY***

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- ***Benefit No. 6:*** Current method of budgeting for specific years may go away ... fund programs in blocks lasting 12-24 months
- ***Accomplished By:*** Congressional buy-in ... highly unlikely since one Congress cannot commit appropriations of succeeding Congress
- ***PM Paradigm Shift :***
  - Needs to look at the time frames involved in specific programs, then make budgeting decisions appropriate to those programs
  - Funding allocated to development blocks without defined requirements is vulnerable to comptroller reprogramming
  - More PMO resources needed for contracting and funds mgt

# ***SEVEN OF 8 BENEFITS TO IMPLEMENTING AN EVOLUTIONARY ACQUISITION STRATEGY***

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- ***Benefit No. 7:*** Reduced time and funding requirements for full-spectrum Operational Test and Evaluation (OT&E) on interim capability
- ***Accomplished By:*** Full OT&E on core capability, then risk-based testing for future blocks
- ***PM Paradigm Shift :***
  - Early identification of significant effectiveness & suitability issues
  - Additional people, time, and schedule required for testing
  - Some activities may have to get used to dealing with less complete data upon which to base their decisions
  - Must foster a close, long-term, working relationship between the developers and testers

# ***EIGHT OF 8 BENEFITS TO IMPLEMENTING AN EVOLUTIONARY ACQUISITION STRATEGY***

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- ***Benefit No. 8:*** User buy-in for an Evolutionary Acquisition strategy
- ***Accomplished By:*** Establish DoD 5000 series EA policy (done), *promote EA awareness (in process), and train the workforce (future)*
- ***PM Paradigm Shift :***
  - Programs don't necessarily end when we acquire something; PMO may be doing both development and sustainment activities
  - Resources don't get freed up for other activities
  - PM's personal commitment to practicing EA
  - Invest time to make PMO people aware of and trained in EA
  - PM becomes an EA proponent within stakeholder community