Spiral Acquisition and the Integrated Command and Control System

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Outline

- Different views of spiral
- Spiral seems to work when...
- Spiral stumbles when ...
- Some product considerations:
  - The Joint Battlespace Infosphere (JBI) may make things easier
  - "Complementing" initiatives play supporting role
- Conclusions - future discussion topics
Developer's View of Spiral -
"Get the Requirements Right"

Design, Code/Fabricate, Integrate Spirals

Spiral 1

Spiral 2

Spiral 3

Spiral N

Final Test (DT&E Delta)

Yes

No

Next Spiral

Acquirer's View of Spiral
"Get the system to the field (right & quickly)"

Concept Development

User Objectives

Increment 1

Technology Insertion Opportunity

Increment 2

Technology Insertion Opportunity

Increment N
"Another Sponsor’s" View of Spiral -
"Get Program Started, then Build it and Field it..."

24 separate reviews within the Air Force Pentagon
alone "required" to start project

Train, Test, & Maintain

Some sample experiences

<table>
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<tr>
<th>Name of Program</th>
<th>Started as</th>
<th>Became</th>
<th>Became as</th>
<th>Became as</th>
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<td>Spiral</td>
<td>Spiral</td>
<td>Concept Experiment</td>
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<td>RSAOC</td>
<td>Evolutionary</td>
<td>Big Bang - Terminated Evolutionary</td>
<td>Restart as Evolutionary</td>
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<td>Will evolve to Spiral after core</td>
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Spiral seems to work when...

- Information technology solutions are available in commercial marketplace and minimal military-unique adaptation required
  - Performance is known
  - Training is ready
  - Sustainment is "built in"
- Beta site users and usability testing is included from program start (and the most challenging requirements are explored early)
- Collaboration and flexible business model on both sides
  - Contractor and user
- Baseline is understood and change control is managed
- Flexible architecture - tolerates requirements revisions

Spiral seems to work when... (continued)

- Flexibility in requirements
  - User involvement and willingness to negotiate
  - Contractor involvement and willingness to negotiate
- Combined Test Force - Tailored testing approved by DoD -- different from the old sequential process
  - Early insertion of test into the acquisition process
  - Facilitate coordination between all user, development, test, and certification organizations throughout development
  - MOA documents test approach roles/responsibilities
- Availability of an environment where developer and user can interact (aka testbed...?)
- Functional and empowered IPTs
Spiral stumbles when...

- Culture, Business Models, or Objectives clash:
  - User wants full capability up front
  - Risk averse acquisition culture adds encumbering processes
  - Asynchronous PPBS, Requirements, Acquisition processes (Some things can be built before the requirements are blessed)
  - Transition to operations and maintenance is omitted from spiral plans
  - Certification processes are required with each release (JTAO, DII COR)
  - Testing/Reliability needs of "Warfighters" preclude commercial practices
  - Contractor expectations (fear of requirements creep)

Funding - PPBS cycle longer than IT technology refresh cycle

Misconception of faster waterfall
- Use old models in shorter time frame (PDRs, CDRs, inflexible ORD, Test) - 1521B culture

Non-Information Technology system

Unprecedented capability which requires a core foundation product on which to build the spiral increments (e.g. airplane for JSTARS, or AWACS)

Integration of commercial product involves "modifications"
- Adaptations from original COTS shifts product off commercial track
- "Glue" code needs to be maintained
- Sustainment becomes a challenge
Another twist... The JBI

- What is the JBI?... a concept with
  - technology attributes: publish/subscribe
  - business attributes: buying components that interoperate
  - operational attributes: "it's the information, silly"

Why is it a twist?... because of how its built

The JBI is assembled from "components" (aka fuselets, legacy applications, agents, etc.)
Is it good? Or bad? For spirals (I vote good)

- JBI structure is: Open, and Component Friendly
- Open enables widespread participation
  - "plug and play"
  - Intermediary layer emphasizing interoperability
- Component Friendly makes cost of entry low
  - Contracted capabilities - for unique needs
  - Speculative capabilities - for dual/multiple use
  - New technology migration possibilities - quick to field
- Incremental introduction of new (or replacement of old) capabilities is enabled by the JBI architecture... it completes the "component" abstraction begun by DII-COE

Complementing forces should increase usage of Spirals

- Experimentation as a means of
  - requirements discovery
  - technology transition
- "Internet-like" introduction of new capabilities
  - "couldn" streamline PPBS process (by avoiding it?)
  - Product Area Directorates (at ESC and elsewhere?) generating increments as "plug-in" components
  - Take S&T capabilities rapidly to the field
- JBI based interoperability
  - eases certification and testing processes
  - Common Environment (DII-COE) - common parts
- "Persistent" test beds (stop dismantling successes)
- And what is the relationship to Simulation Based acquisition?...
Where's the rub?... (funding...same as last year)

- Funding
  - Core system protocol growth, config management,
  - Information management
  - Mission relevant plug-in's
- Testing - compatability, suitability, performance
- Training - stay up to date with "increments"
  - User/sustainer/acquirer/developer/Inventor/Research connectivity
  - Experimentation - for Operations innovation & new doctrine to be trained
  - Testbed for transition to field and perpetual sustainment/modernization
  - Commercial sector focus on componentware
  - Encouraging synergy among programs

Conclusion:
aka: topics for further discussion

- Technologically we can generate and assimilate new capabilities far more rapidly than we could with traditional single mission system development efforts.
  - Is emphasis on 'large scale systems' correct?
- We now need the corresponding Business/Acquisition processes to exploit "internet pace" productization.
  - It's not just the development cycle - pre-development activities need to be (and can be) shortened
  - Collaboration among the key parties is vital during development
  - Spiral model needs to address full life cycle events (field transition, training, sustainment, and end of life)

Process (spiral), Product (architecture), and Operating Environment (business model) are intertwined...
They need to complement one another
Issues (from last year)

- No AF funds exist for implementing spiral development
- There is no established funding strategy for spiral development
- The dynamic nature of spiral development requires a flexible financial strategy
  - Initiatives acquired / procured each year varies
  - Fielding of developed system unknown - depends on number of systems acquired / procured
- Acquisition, programming, and budget process does not support the rapid fielding of spiral development successes
Possible Strategy (from last year)

- Establish a spiral development "wedge" that is not money "color" specific i.e. like BRAC $s
  - Only assign the "color" based upon how the money was spent (R&D, O&M, etc.)
- Based "wedge" amount on "Spiral Development Plan" that:
  - Identifies an annual objective of initiative that is reasonable, affordable, manageable, and executable
  - Based on C2 goals, objectives, and end-states for that period of time
  - Can be sustained within current operation and maintenance cost invested in the "C2 as a weapons systems"

Possible Strategy (from last year) Continued

- Show offsets from systems cut based upon the spiral development initiatives
- Allow spiral development money to be executed within two years versus one year
  - Provides flexibility for a 18-month development and fielding cycle