Agenda

- About Xerox
- Lifecycle Anxiety Waves at Xerox
- Spiral Case Study
- Life After Spiral ...
- Anchored Software Process
- Anchored Lifecycle Macro Process
- Technology Readiness
- Lifecycle Selection Caveats
- Market-driven Product Development

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Lifecycle Anxiety Waves at Xerox

Pre-1987: No lifecycle awareness
Waterfall IS the lifecycle model.

1987-92: "What should we do with the waterfall?"
Standard, documented processes are still waterfall, in some cases mimicking existing hardware processes. Improvised solutions to mitigate waterfall shortcomings.

1993-95: "Let's try the spiral!"
Managers of a major program plan and operate around the spiral. Software Risk Evaluation in '95 shows discouraging results.

1996-97: "What should we do?"
Fallback to waterfall improvisations. Random exposure to Objectory, Rational processes and tools.

1997-99: Adapting the Anchor Point concept
Push for incremental/iterative processes and platform development for variant products.

Y2000 challenge: Product Line Processes
Case Study Program Characteristics

- Major, strategic program
- Open, scaleable, high performance core for a family of printers (50 - 600 page/min, including color)
- Large number of PDLs
- Enterprise-wide connectivity
- Open, industry standard platforms (SPARC first)
- Distributed O-O Design and Development
- Spiral is the pivotal development model

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Program Plan Characteristics

- Planned 6 turns to generate the first major release
- Planned 6 Architecture Definition Iterations
- Out of the 21 major line-items of the plan:
  1. System Integration and Test
  6 integration periods are planned
  2. Hardware related
     Hardware design overlaps feature specifications and the first iteration of the software architecture definition
  3. Non-engineering aspects
     Marketing, Customer engagement, pricing, sales training, etc.

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**Spiral Model**

Legend:
- **A**: Architecture
- **P**: Prototype
- **RA**: Risk Assessment

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**Issues identified**

- During the phases not only the prototypes became "throwaways", but the architecture versions as well
- Risk analysis was superficial, and also inefficient
- As a result, architecture never stabilized
- Overly aggressive plan created an overload of new technologies
- Technology experimentation obfuscated architecture development
- Resolution of technology risks was overwhelming, further preventing the stabilization of the architecture

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Life after Spiral...

- "Spiral", as a powerful metaphor and graphic representation of returning and repetitive activities is here to stay
- The key, new concept is anchoring the process
- We need to address the issue of synchronizing many spirals for complex systems
- We also need to address the synchronization of software spirals with hardware waterfalls**


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Xerox Mitigation Approach

- Anchored "Lifecycle Macro Process"
  This is the recommended solution to ease the synchronization of many spirals, and the synchronization of spiral software development with the hardware waterfall.

- "Technology Readiness"
  Rigorous technology acquisition, delivery and demonstration process
Anchored Software Process

LCO  LCA  IOC  (SDR)  (EOM)

Anchor Point Definitions per Boehm:
LCO  Life Cycle Objectives
LCA  Life Cycle Architecture
IOC  Initial Operational Capability

New, Xerox-specific Anchor Points:
SDR  Software Delivery Readiness
EOM  End Of Maintenance

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Anchored Lifecycle Macro Process

Generic "Product"

Research  Hardware  Software

Anchor Point  Anchor Point  Anchor Point

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Lifecycle Selection

- **Research**
  Highly creative, inventive process. Most of the time runs on open-ended schedule. Lack of result is acceptable. Researchers most of the time are not very receptive to any process/lifecycle ideas, but spiral model is appropriate.

- **Technology Definition (or Acquisition)**
  The risk still exists that the application of research results or the use of available off-the-shelf technology is not feasible or viable. The spiral model is appropriate, since the considered risks are primarily technical. Simply put, many times the risk assessment will simply conclude that "... it will not work under the circumstances."

- **Technology Readiness**
  It needs to be demonstrated that the hardware will be manufacturable, and neither the hardware nor the software will need extraordinary, open-ended efforts during the development and manufacturing process phases.

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Lifecycle Architecting Caveats

- It is **o.k.** to combine Research and Technology
- It is **not o.k.** to combine Research or Technology Development with Product Development
- Note that non-engineering risks, such as business risks are not comprehended in this model.
Business and engineering domains represent different kind of risks, consequently different risk mitigation approaches needed. **Engineering life-cycle models must have strong architecture focus.**

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**Any Questions?**

Your head is spinning?

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