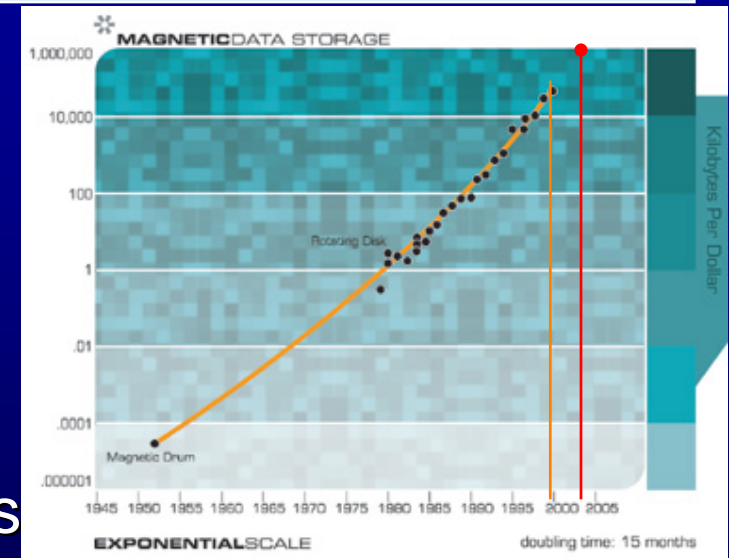


Raging Incrementalism — System Engineering for Continuous Change

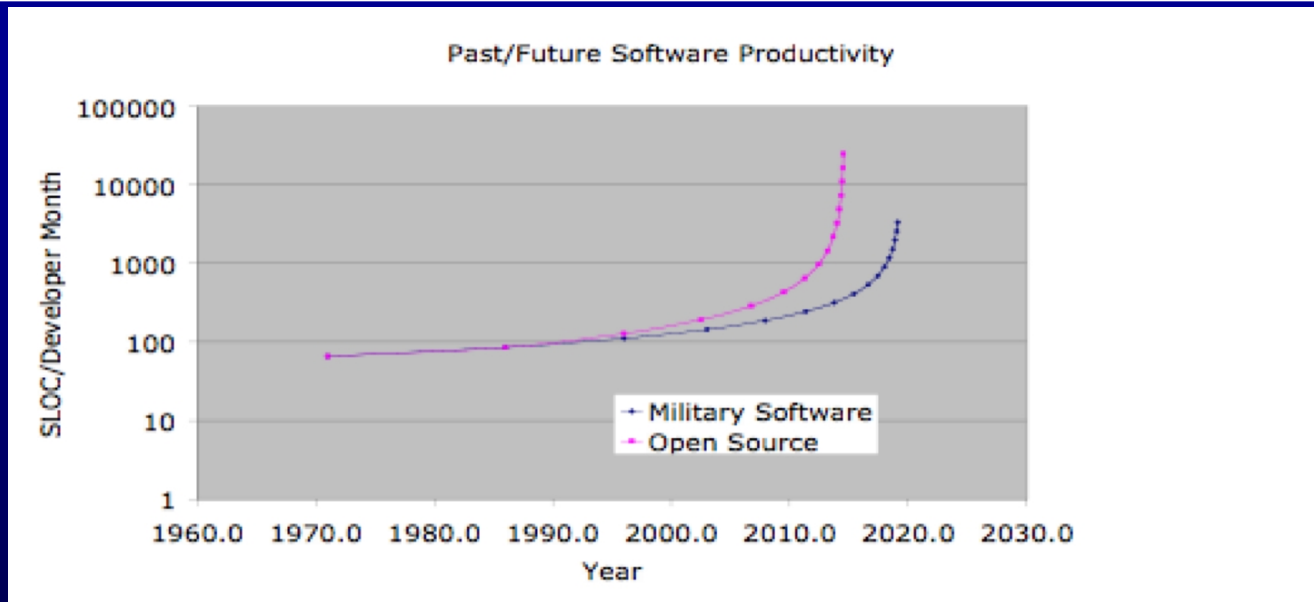
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Hyperexponential Change

- Rate of change of change
 - Exponential improvement
 - Doubling periods
 - Technical progress in-the-large
 - By 2025 100 years of progress
 - By 2101 20,000 years of progress
- Hyperexponential change changes everything
 - Everything you knew yesterday is wrong today
 - The system that you haven't built yet is obsolete
 - The integrator is king



Hyperexponential Productivity



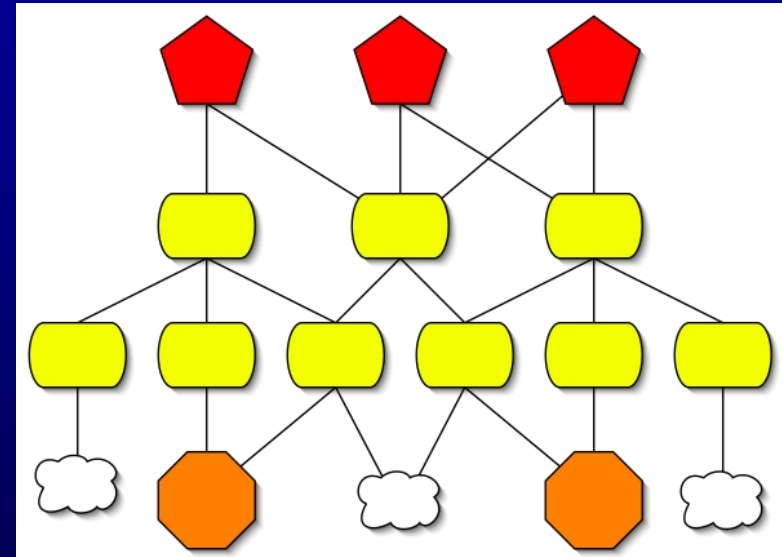
- Military software
 - “Doubling period” shrinking by 30%
 - SLOC/month increasing by 30% per “doubling period”
- Open source software
 - Doubling period shrinking by more than 35%?
 - SLOC/month increasing by 50%?

Raging Incrementalism

- Surf the tsunami of change
 - Commodity hardware
 - Open source software
 - Distributed (peering) constructions
 - » Hosts exchange roles of client and server
 - REpresentational State Transfer (REST)
 - » Integrates systems using “stateless” transactions
 - » Based on study of the success of the web
- Believe in protocols
- Encapsulate system elements as *bricks*
 - Inexpensive system building blocks

Launch Range Video System

- Range video architecture
 - Peering network
 - All interactions are RESTful
- “Smart” video camera brick
 - Shuttle PC & Firewire camera
 - Network camera control
 - Software-based MPEG-4 encoding
 - Precision timestamps for video frames
 - Digital video streaming
- Video distribution server brick
 - Based on open-source Darwin Streaming Server from Apple
- Video archive brick
 - 4U commodity rack server containing 4 terabytes of storage
 - FreeBSD



The Zen of Raging Incrementalism

- Primary
 - Eschew superfluage
 - Write nothing
 - Buy nothing
 - Integrate everything
- Secondary
 - Always obsolete
 - Never finished
 - A few weeks is forever
 - Computation is free
 - The better is the enemy of the good enough

Summary

- Hyperexponential change changes everything
- Raging incrementalism
 - Exploits change on behalf of system engineering
 - » Accommodates continuous change and upgrade
 - Addresses design, implementation, deployment, and programmatics
 - Fundamental cheap building blocks for enterprise-scale computing infrastructure
- Integration is prized above all else