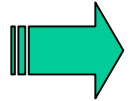


LCA ARB Feedback and MBASE LCA Wrap-Up

CS577A

2002

Outline



- Where are you at?
- LCA ARB Feedback
- Exemplars
- LCA ARB Common Problems
- Where are we going?

Congratulations...

You are going to be married to your
project!

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You are going to be married to your
project!

*Lets review how we got here, and where
were headed*

LCA – where are you at?

Success criteria:

Commit to one feasible architecture

(subject to risk and project considerations)

The Wedding

- For LCA:
 - Design
 - Resolve all significant architectural issues
 - Advanced prototyping
 - Refine
 - Resolve model clashes
 - Add significant details
 - Remove non-significant details - no “fluff”
 - Schedule, roles, commitments, effort estimates, etc.
 - Justifine! (Justify)
 - Assure architecture is faithful to concept
 - Assure value of system vs. stakeholder investment
 - Reduce risk exposure

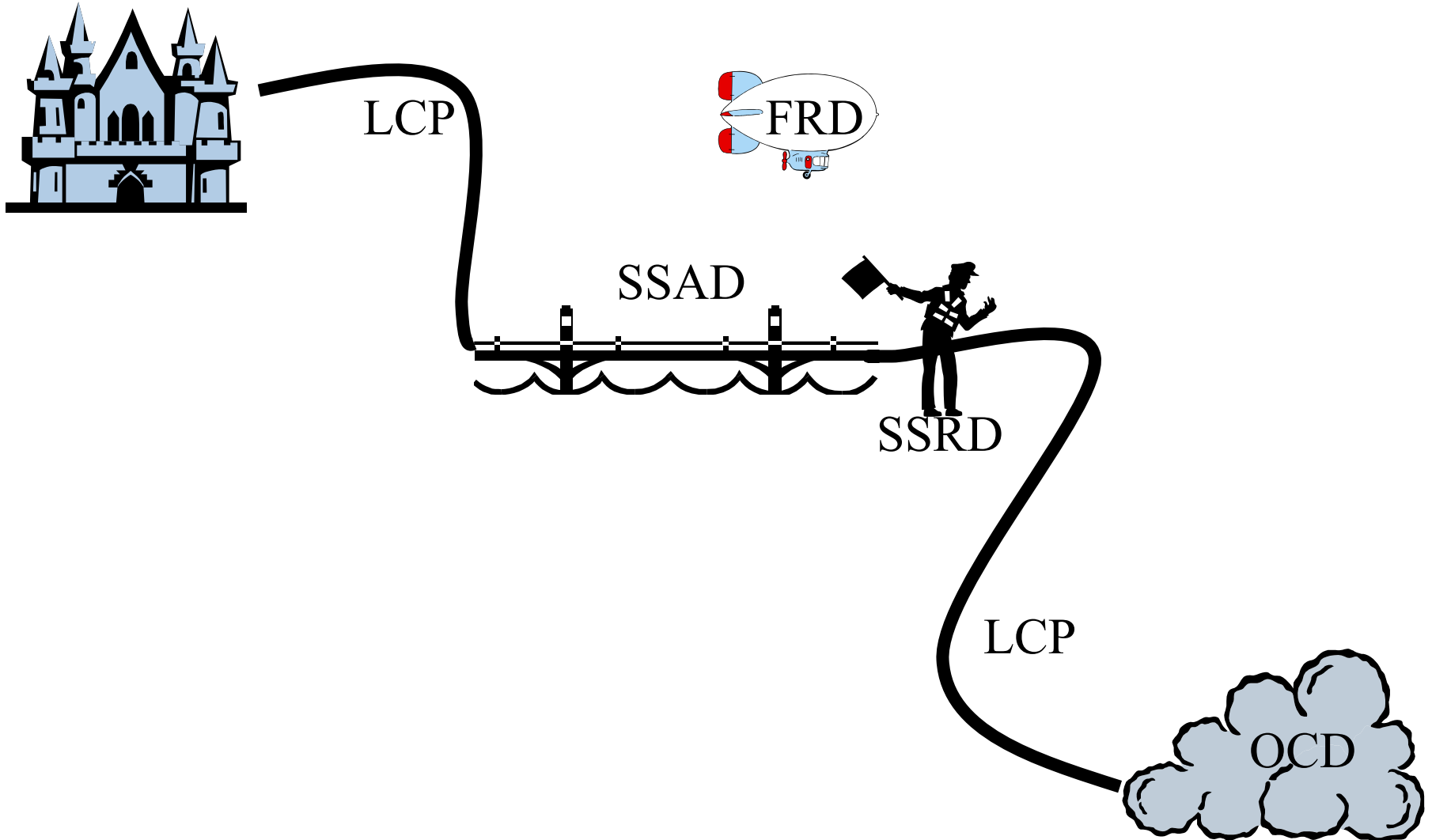
What does this involve?

- Several iterations through MBASE models
 - Model integration and integrity paramount
- Refine WinWin negotiations
 - Close out old issues
 - Cover all win conditions
 - Identify and deal with new win conditions
- Writing code
 - Advanced prototyping to resolve risky architectural issues
 - Head start on implementing critical requirements (for assurance, schedule, etc.)

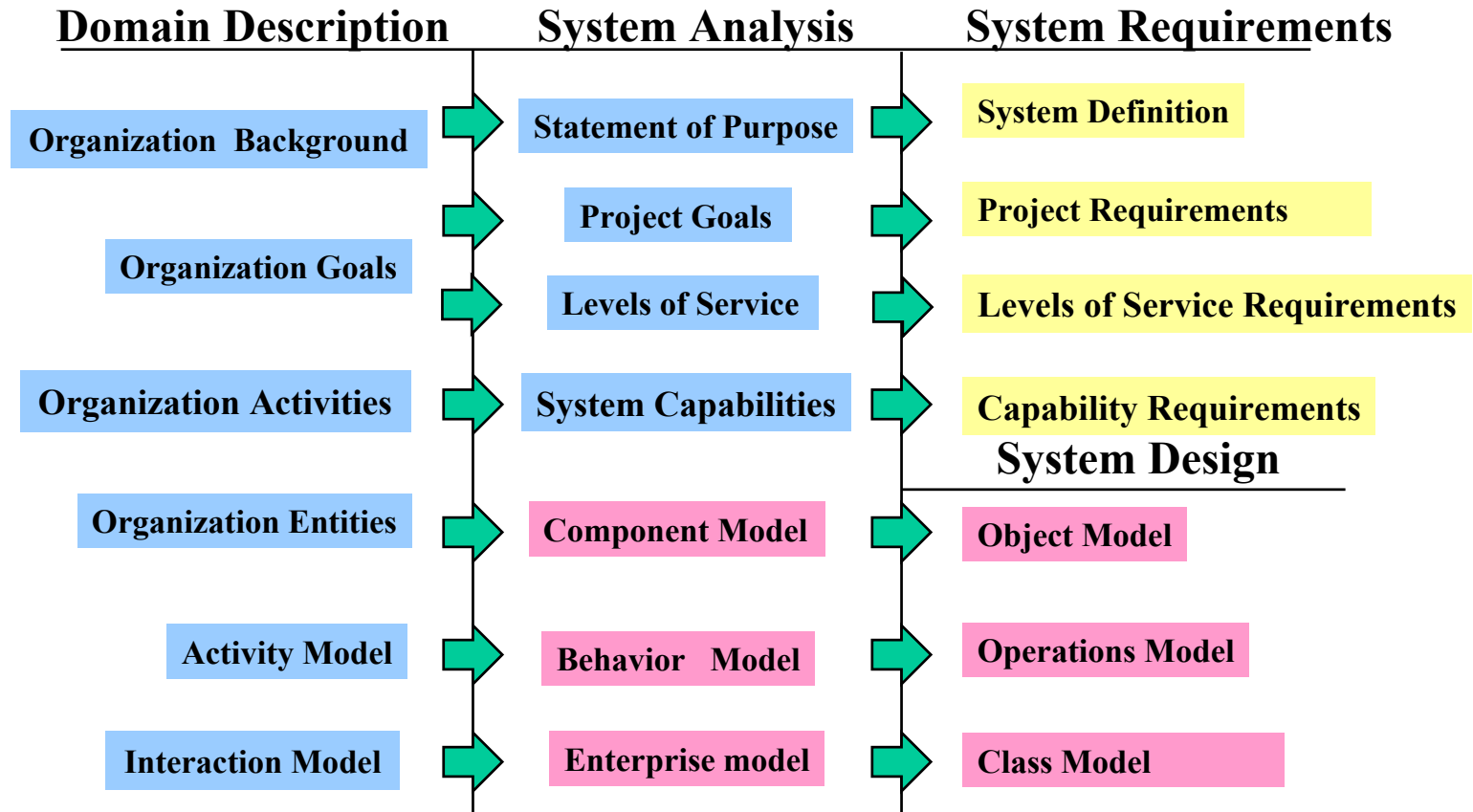
Life Cycle Architecture (LCA)

- more formal, with everything tracing upward and downward
- no major unresolved issues or items, and closure mechanisms identified for any unresolved issues or items (e.g., “detailed data entry capabilities will be specified once the Library chooses a Forms Management package on February 15”)
- no more TBD's
- there should no longer be any "possible" or "potential" elements (e.g., Entities, Components, ...)
- no more superfluous, unreferenced items: each element (e.g., Entities, Components, ...) either should reference, or be referenced by another element. Items that are not referenced should be eliminated, or documented as irrelevant

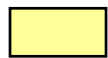
Getting From A to B



Integration of MBASE System Definition Elements



Operational Concept Description (OCD)



System and Software Requirements Definition (SSRD)



System and Software Architecture Description (SSAD)

Class Project Artifacts

- 1. An Operational Concept Definition**
 - 2. A Prototype of Key System Features**
 - 3 A System Requirements Definition**
 - 4. A System and Software Architecture Definition**
 - 5. A Life Cycle Plan**
 - 6. A Feasibility Rationale, assuring the consistency and feasibility of items 1-5**
For 577b projects
-
- 7. A Detailed Construction Plan consistent with 1-6**
 - 8. The Test Results and Quality Assurance for 1-7**
 - 9. An Initial Operational Capability of the system derived from 1-8**

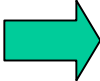
MBASE Milestone Elements

Milestone Element	Life Cycle Objectives (LCO)	Life Cycle Architecture (LCA)
Definition of Operational Concept	<ul style="list-style-type: none"> • Top-level system objectives and scope <ul style="list-style-type: none"> - Shared vision of expected initiatives and outcomes [COTS strategy for reuse and legacy elements] - System boundary [major COTS component boundaries within system] - Environment parameters and assumptions [CBS success factors] - Evolution parameters [major COTS vendor product availability, upgrade cycles] • Operational concept <ul style="list-style-type: none"> - Operations and maintenance scenarios and parameters [COTS maintenance] - Organizational life-cycle responsibilities (stakeholders) [major COTS vendors] 	<ul style="list-style-type: none"> • Elaboration of system objectives and scope by increment • Elaboration of operational concept by increment [COTS operation and use summary, vendor support strategies, COTS adoption impact on organization]
System Prototype(s)	<ul style="list-style-type: none"> • Exercise key usage scenarios [demonstrate key COTS capabilities and validate interfaces, scope use and value of major COTS products] • Resolve critical risks [COTS selection and evaluation plan] 	<ul style="list-style-type: none"> • Exercise range of usage scenarios [complete COTS evaluations, initial COTS configuration and training, initial COTS tailoring] • Resolve major outstanding risks [resolve COTS integration issues and level of use]
Definition of System Requirements	<ul style="list-style-type: none"> • Top-level functions, interfaces, quality attribute levels, including: <ul style="list-style-type: none"> - Growth vectors - Priorities - Legacy systems and environments - [Establish key COTS evaluation attributes and screening parameters] • Stakeholders' concurrence on essentials [mandated COTS packages, suppliers and vendors, identify negotiable and non-negotiable COTS requirements, COTS evaluation win-conditions and constraints] 	<ul style="list-style-type: none"> • Elaboration of functions, interfaces, quality attributes by increment <ul style="list-style-type: none"> - Identification of TBDs (to-be-determined items) [mapping of COTS capabilities to requirements] • Stakeholders' concurrence on their priority concerns [concurrence on COTS imposed requirements and 90% re-worked requirements tradeoffs]

MBASE Milestone Elements (2)

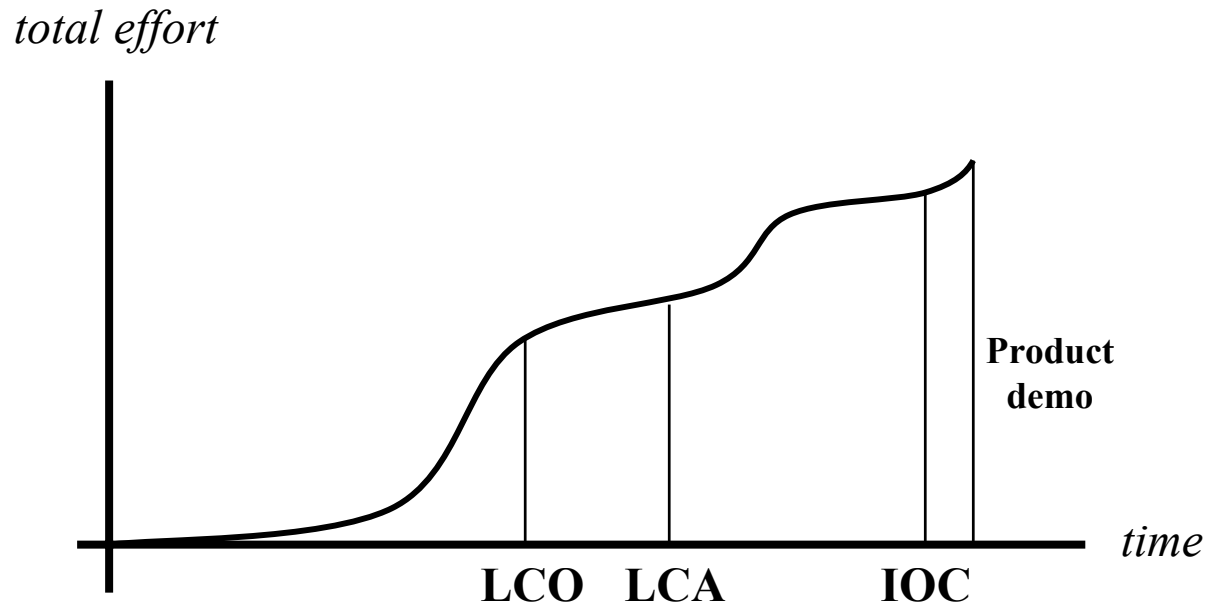
Milestone Element	Life Cycle Objectives (LCO)	Life Cycle Architecture (LCA)
Definition of System and Software Architecture	<ul style="list-style-type: none"> • Top-level definition of at least one feasible architecture <ul style="list-style-type: none"> - Physical and logical elements and relationships, including top-level domain factoring and identification of possible design patterns - Choices of COTS and reusable software elements [mapping of critical system components to COTS products] • Identification of infeasible architecture options 	<ul style="list-style-type: none"> • Choice of architecture and elaboration by increment <ul style="list-style-type: none"> - Physical and logical components, connectors, configurations, constraints - COTS, reuse choices [CBS design (mapping of components and system factors to COTS), COTS package configurations] - Domain-architecture and architectural style choices [design for COTS glue code and wrappers] • Architecture evolution parameters
Definition of Life-Cycle Plan	<ul style="list-style-type: none"> • Identification of life-cycle stakeholders <ul style="list-style-type: none"> - Users, customers, developers, maintainers, interpreters, general public, others [COTS suppliers and vendors] • Identification of life-cycle process model <ul style="list-style-type: none"> - Top-level stages, increments [COTS deployment – prototyping, evaluation, schedule, risks impact of schedule and cost, stakeholders, license negotiations] • Top-level W W W W W H H * by stage [COTS product lifecycles (releases, delivery dates, costs, training needs)] 	<ul style="list-style-type: none"> • Elaboration of W W W W W H H * for Initial Operational Capability (IOC) <ul style="list-style-type: none"> - Partial elaboration, identification of key TBDs for later increments - [COTS upgrades, patches] - [License management (non-standard provisions)] - [COTS users, maintainer, and developer skill set attributes] - [COTS training plan] - [COTS risks realized; integration, cultural, economic]
Feasibility Rationale	<ul style="list-style-type: none"> • Risk assessment and mitigation plans [COTS vendor issues – product availability, stability, costs] • Assurance of consistency among elements above <ul style="list-style-type: none"> - Via analysis, measurement, prototyping, simulation, etc. - Business case analysis for requirements, feasible architectures [buy versus build rationale, justification of CBS strategy, CBS tradeoffs] 	<ul style="list-style-type: none"> • Assurance of consistency among elements above [feasibility of COTS vendor relationships, COTS maintenance costs, organization readiness to implement COTS] • All major risks resolved or covered by risk management plan [completed license contracts, COTS product alternatives and marketplace issues, COTS organization culture issues, vendor commitments]

Major Class Project Milestones

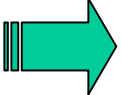
September 9	--	All teams formed
September 20	--	Initial Prototypes/Storyboards
September 27	--	WinWin Negotiation Results
October 9	--	LCO Drafts on Web Site
October 15-21	--	LCO Architecture Reviews
October 28	--	LCO Package Due
November 13	--	LCA Drafts on Web Site
 November 20-26	--	LCA Architecture Reviews
December 2	--	LCA Package Due
December 9	--	Individual Critiques Due

Are You Putting in the Right Effort?

Effort Graph (conceptual) for 1-semester Columbia University Course

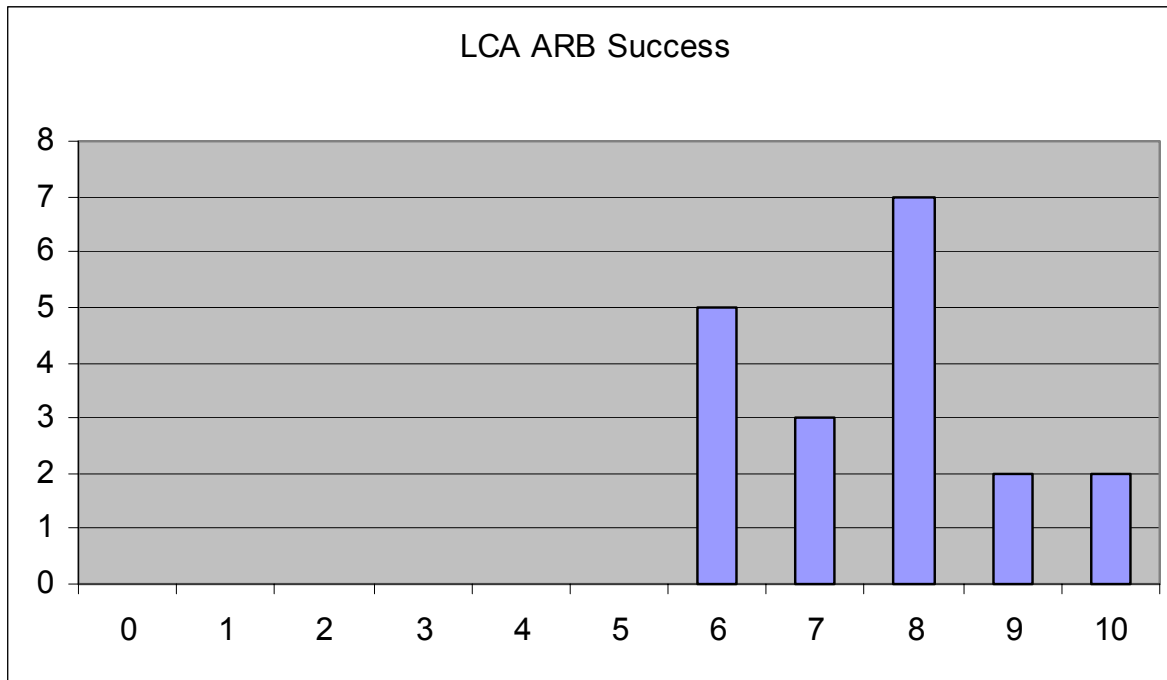


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LCA ARB Assessments

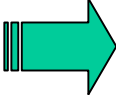
	ave LCA SC	OCD	Proto	SSRD	SSAD	LCP	FRD
mean	7.38	8.00	7.59	7.70	7.01	7.06	7.04
var	1.80	1.70	3.36	1.41	2.69	2.06	2.49
std	1.34	1.30	1.83	1.19	1.64	1.44	1.58



Teams failing LCA
success at ARB: 0

Teams with unknown
ARB success: 3

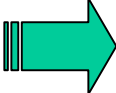
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LCA ARB Exemplars (with respect to project)

MBASE Element	Team	What
OCD	14	Organization Goals
	1	Adjustment for COTS Assessment project, organization Goals
Prototype	14	Clear feature coverage, off-nominal cases
	22	Comprehensive coverage of features, risky design areas
	10	COTS comparison and assessment with respect to requirements
SSRD	8	Overall very good!
	14	Off-nominal requirements, prioritization
	19	Mapping of components to entities
	20	Mapping to OCD
	22	Clearly specified
SSAD	8	Object models
	17	Enterprise models
	3	Component design with objects
	1	COTS evaluation framework
	22	Mapping of reqs to arch. choices, JSP-DB designs, DB schema
LCP	16	Project specific schedule and responsibilities
	8	Project specific schedule and responsibilities and risks
	14	Design implementation details, risk impacts, 577b focus
	2	Project specific schedule and responsibilities, work breakdown structure
	12	Effort and responsibility charts
	19	Responsibilities breakdown, budget/effort analysis
	3	Budget/effort, COCOMO, risk impacts
	20	Parallel development schedule, mapping of construction to use-cases
	22	Construction increments, process mapping to schedule, mappings to use-cases, project specific schedule and responsibilities
FRD	8	Operational concept and requirements satisfaction (2.2.1 and 2.2.2), use of relative values for business case 2.1.5
	3	Process rationale, ROI analysis, reqs. Satisfaction
	1	COTS process strategic and rationale for new process assessment, COTS assessment effort estimation and feasibility within resource constraints
	16	System benefits, requirements and OCD satisfaction
	22	Overall very good expect section 3.3

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OCD Common Problems

- Results chains often missing initiatives outside of building proposed system
- Add software maintainer as key stakeholder
- L.O.S. goals usually need performance baselines and quantitative measures, “how well” certain system capabilities are desired to perform, must reference!
- Reconcile Sys. Caps. With SSRD Sys. Behaviors

Prototype Common Problems

- Continue to explore usage issues with clients via prototype extension, end-user exercising
 - Focus on risk items, not easy-to-do things (password processing)
 - Must involve representative users
- For some projects, explore COTS level-of-service issues via prototyping, benchmarking, exercise
- Prototyping activities must be planned and managed (see LCP)
- **Risky items should be prototyped if possible as soon as possible – use of complicated scenarios, algorithms**

SSRD Common Problems

- Superfluous requirements, developer initiated requirements
- Only specify elements that are actually required through WW agreements, IKIWISI prototyping, org. mandate, etc. Indicate how became required
- Incorrect specification of requirements
 - Used MARS for Sys. Caps., did not use MARS for L.O.S. and Project
- Some level-of-service requirements overly vague
 - Easy to use, high availability, “good” performance
 - Specify MARS criteria, ‘R’ for relevant Sys. Caps. specifically ‘S’
- Evolution requirements to specified as “implementable and testable”
 - use them to constrain architecture

SSAD Common Problems

- Design elements in Component Model (“MySQL”)
- Ineffective description of designs with COTS
- Too little or too much design for LCA
 - Depends on project type (1-semester needs some design, COTS assessment needs top-level only with alternatives), where and when will the project be completed?
- If you see same items in the design as components then those items are design elements
- No alternative architectures specified
- Confusion over Enterprise class and Component model
- Over emphasis on trivial operations (documenting trivial use-cases and sequences)
- Providing both sequence and collaboration diagrams (they are equivalent so use only one)

LCP Common Problems

- Be concise about deliverables (do not expand LCO, LCA package elements, reference guidelines if needed)
- Process choice arbitrary and not planned, no elaboration on activity element plans, milestones, and schedule
- Be much more specific about 577b plans
 - CTS activity planning must be included now!
- Risk mitigation impact on schedule and resources not indicated
 - All risks affect schedule, plans, resources (costs)
- Difference between FRD and LCP risks
 - Must be consistent and complementary
 - LCP “what, management activities, impact on schedule and resources”, FRD “how bad, worst case and typical case, why management plans will succeed”
- Rationale for COCOMO II Drivers
- CTS details should go in CTS documents

FRD Common Problems

- FRD Business case
 - Cost estimates need to consider non-\$ costs such as effort (esp. developer), utils. etc.
 - Quantify costs and value (for ROI), not qualitative
 - Include project success criteria
 - Value estimates need to tie to OCD Org. Goals, Results Chain, Benefits Realized
 - ROI summaries need to consider initial costs, ongoing costs, and future costs as compared to initial value, ongoing value, and future value
 - Quantify business-case cost and value via representative scenarios
 - Include COCOMO cost driver rationale when applicable
- Focus on 577b risks: skills, schedule, COTS
 - Big risks (timely or adequate COTS) should have fallbacks
- System priorities need to be consistent with SSRD priorities
- Must elaborate on process selection (make use of process selection matrix parameters in FED 3.3 if possible)
- Process rationale should identify specific core capability
 - And propagate it to LCP milestones
- In FRD 2.2.1 relate OCD project goals, capabilities, and L.O.S. goals to SSRD
- Operations and maintenance effort by people already in organization is not free!! (re-allocation of tasks)
- Operational cost is NOT an investment
- Proposed system becomes current system at some point of time
 - Use of net savings (effort savings – administrative & operational costs)

General LCA Package Feedback

- Some projects need to start consideration of CTS plans now
- Have more than one team member work on each MBASE section (especially for SSAD, LCP, and FRD) as a “sanity” check

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The Road Ahead Ahead: IOC

Success criteria

The initial operational capabilities of the system as constructed satisfy the architecture models

* This includes all the MBASE models, not just SSAD

** Completeness is not as important as soundness

Initial Operational Capability (IOC)

- Software preparation
 - Operational and support software
 - Data preparation, COTS license
 - Operational readiness testing
- Site preparation
 - Facilities, equipment, supplies, vendor support
- User, operator, and maintainer preparation
 - Selection, teambuilding, training

Specialty Plans

- Quality Management Plan
- Test Plan
- Inspection Plan
- Configuration Management Plan
- Security Plan (optional)
- Safety Plan (optional)

Critical Success Factors for Adoption - I

Application	Client Characteristics					Transition Preparation			Stable Envir.	Outcome	
	Focused	Representative	O & M Resources	Collaborative	Domain Knowledge	Software	Site	People		Client Success	Adopted
1996-97											
EDGAR Business Data	+	+		+	+	+			+	+	
Medieval Manuscripts	+			+	+	+			+	+	
Technical Reports	+	+		+	+	+				+	
Latin American Pamphlets	+	+		+	+	+			+	+	
Cinema-TV	+	+	+	+	+	+	+	(+)		+	(+)
Image Archives				+		+			+		
1997-98											
S-Charts	+	+	+	+	+	+	(+)	+	(+)	+	(+)
Global Express	+	+	+	+	+	+		+		+	
Hancock Virtual Museum	+	+	(+)	+	+	+	+	+		+	
Serial Control Records	+	+	+	+	+	+	+	+	(+)	+	(+)
B-School Working Papers	+	+	+	+	+	+	+	+	+	+	+
1998-99											
Data Mining	+	+	+	+	+	+	+	+	(+)	+	(+)
Dissertations	+	+	+	+	+	+	+	(+)	+	+	(+)
Hispanic Archive	+	+	+	+	+	+	+	+		+	
WWI Archive	+	+	+	+	+	+	+	+		+	(+)

