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bSa Information Exchange Projects: COBie Calculator

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- Work was performed by Kristine Fallon Associates, Inc.
- Authors: Kristine Fallon, Omobolawa Fadojutimi, Gregory Williams, Naila Crawford, Danielle Gran
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Agenda

- COBie Calculator Project
- Forms of the Calculator
- Feasibility
- Availability of Material
- Demonstration



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COBie Calculator Project

- Create a tool to calculate savings:
 - From use of Technology:
 - Computable building information
 - Standard data format: COBie
 - Online Project Collaboration & Management System
 - Coverage: Managed Assets
 - Space
 - Equipment
 - Lifecycle stages
 - Planning
 - Design
 - Construction
 - Turnover



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Approach

- Developed business process model for 25 Life Cycle stages
- Defined 210 variables associated with the tasks in the business process model
- **Only costs associated with specification, documentation and fulfillment of managed asset requirements (space and maintained equipment)**
- **Only costs incurred by Owner, Architect (A/E) and Contractor**



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“Current” Cost Assumptions

- “Current” defined as completely paper-based
- UFC and UFGS project requirements
- Real world data from projects (CTA, U of C)
- Personal experience of project team of industry professionals
- Publically available indices, such as Labor Rates

“Expected” Cost Assumptions

- Manufacturers provide searchable product data in COBie format
- BIM tools for design and construction both import and export COBie data
- FM systems import COBie data
- Software exists:
 - To check the COBie data for:
 - Completeness
 - Conformance to the specification
 - To automate comparison of the contents of two COBie-format product description files:
 - Specification
 - Manufacturer’s product data
- Project managed in a project collaboration system with automated workflow and audit trail



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Anticipated Savings Categories

SEARCHING:	Automated comparison of product data to specifications
VALIDATING:	Automated checking
REFORMATTING:	Adoption of a single, open standard data format
RECREATING:	Fewer revision cycles Minimize rework
COPYING:	Reliance on electronic documents and data
HANDLING:	Managed project collaboration and management systems automate distribution and logging

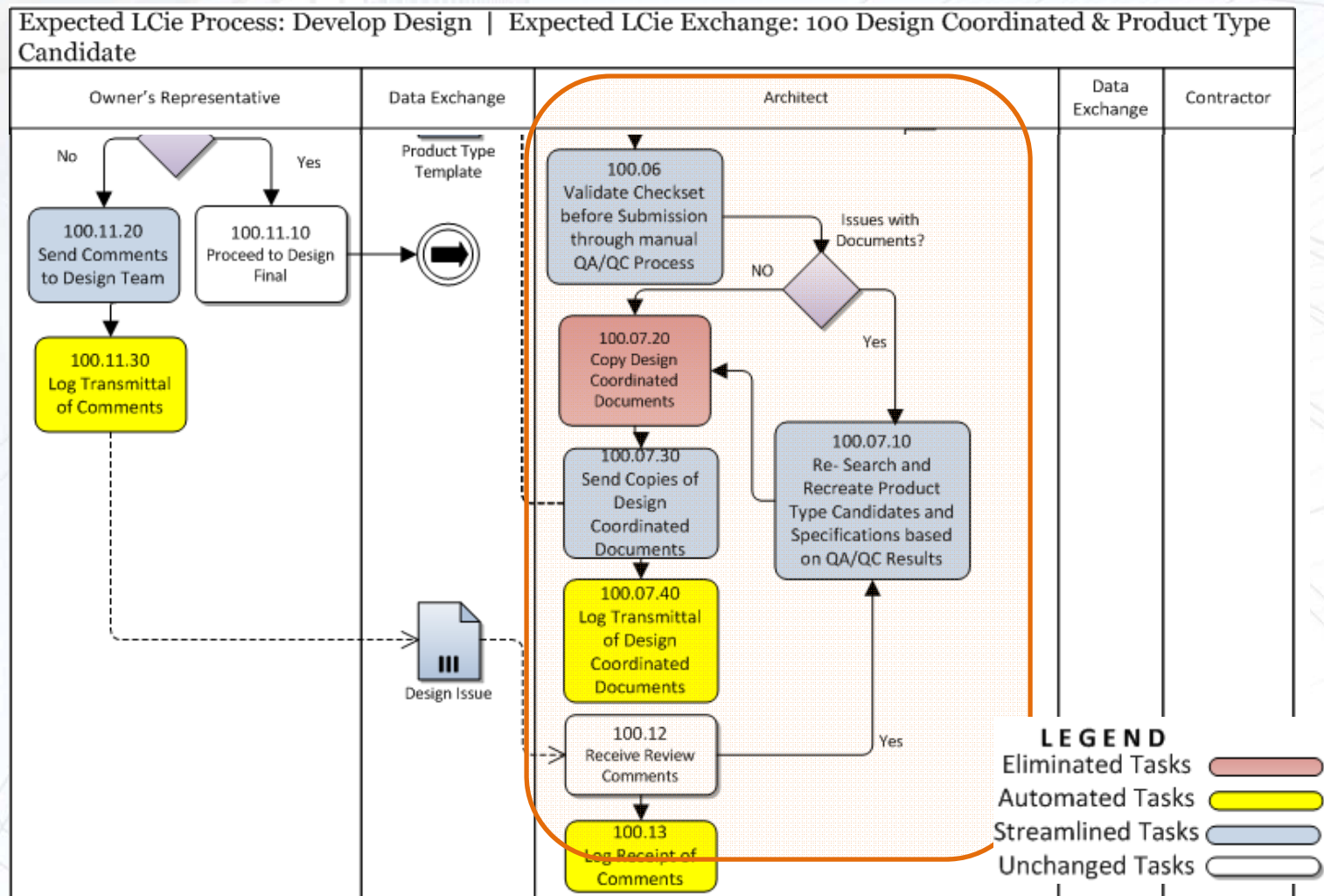


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Business Process Model – Expected Design Coordinated



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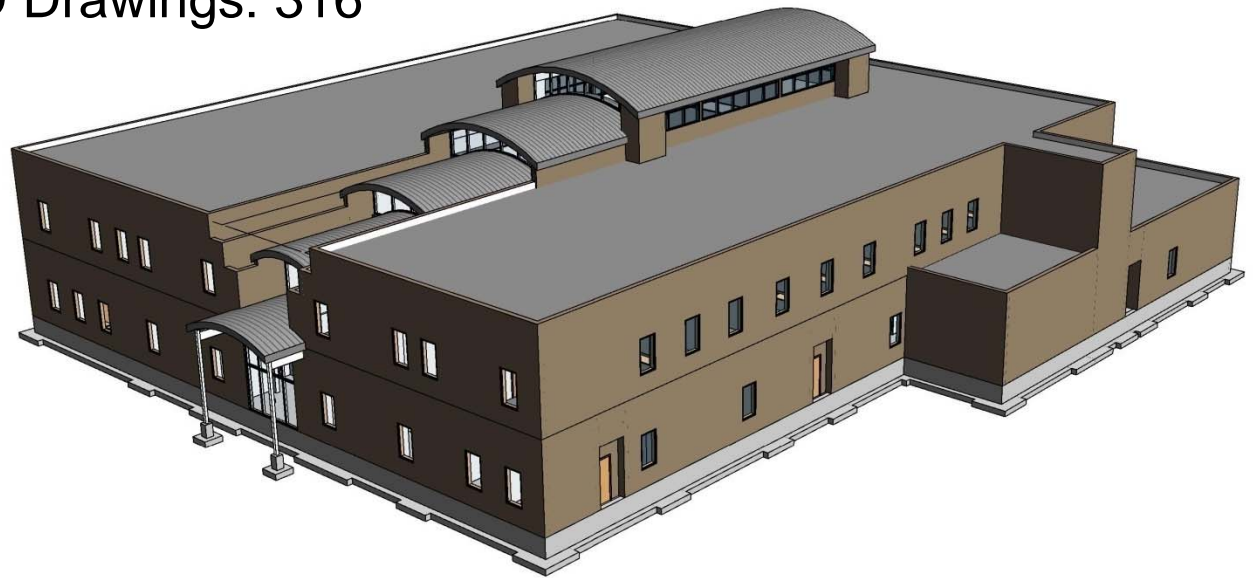
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Analyze Typical Projects

- Medical Clinic Statistics:

- Size: 49,571 SF
- # of Product Types: 155
- # of Components: 3,950
- # of CD Drawings: 316



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Project Phase	Current Process	COBie Process	Savings	% Savings
LCie 01 - Facility Criteria	\$0.00	\$0.00	\$0.00	0%
LCie 02 - Design Specification	\$0.00	\$0.00	\$0.00	0%
LCie 03 - Feasibility Study	\$10.00	\$10.00	\$0.00	0%
LCie 04 - Project Definition	\$0.00	\$0.00	\$0.00	0%
LCie 05 - Space Program	\$510.00	\$10.00	\$500.00	98%
LCie 06 - Product Program	\$890.00	\$30.00	\$860.00	97%
LCie 07 - Request for Proposal	\$80.00	\$80.00	\$0.00	0%
LCie 08 - Design Early	\$11,800.00	\$300.00	\$11,500.00	97%
LCie 09 - Design Schematic	\$31,800.00	\$1,500.00	\$30,300.00	95%
LCie 10 -Design Coordinated	\$68,000.00	\$7,600.00	\$60,400.00	89%
LCie 11 - Design Final	\$28,200.00	\$1,900.00	\$26,300.00	93%
LCie 12 - Request for Proposal	\$20.00	\$10.00	\$10.00	50%
LCie 13 - Inquiry Issue	\$100.00	\$100.00	\$0.00	0%
LCie 14 - Pre-Construction Plan	\$0.00	\$0.00	\$0.00	0%
LCie 15 - Inquiry Issue (RFI)	\$26,000.00	\$26,000.00	\$0.00	0%
LCie 16 - Product Type Selection	\$0.00	\$0.00	\$0.00	0%
LCie 17 - System Layout	\$0.00	\$0.00	\$0.00	0%
LCie 18 - Submittal Package	\$84,700.00	\$3,100.00	\$81,600.00	96%
LCie 19 - Submittal Issue	\$61,400.00	\$500.00	\$60,900.00	99%
LCie 20 - Purchase Order	\$0.00	\$0.00	\$0.00	0%
LCie 21 - Product Installation	\$12,900.00	\$0.00	\$12,900.00	100%
LCie 22 - Start-Up	\$0.00	\$0.00	\$0.00	0%
LCie 23 - Product Inspection	\$326,800.00	\$13,100.00	\$313,700.00	96%
LCie 24 - Punchlist Issue	\$0.00	\$0.00	\$0.00	0%
LCie 25 - Turnover Package	\$15,400.00	\$300.00	\$15,100.00	98%
Total	\$669,000.00	\$55,000.00	\$614,000.00	92%



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Short Form COBie Calculator

- This version requires input of:
 - 23 Cost Variables
 - 29 Reduction Factors
- Creates Current and Expected Assumptions sheets and LCie sheets automatically
- Users can override the calculated Assumptions



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Comparison of Results

	Long Form	Short Form	Difference
Current Costs	\$598,000.00	\$563,000.00	5.85%
Expected Costs	\$24,000.00	\$26,000.00	-8.33%
Savings	\$574,000.00	\$537,000.00	6.45%
Percent Savings	96%	95%	1%

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Program Form of COBie Calculator

- Based on Short Form
- Allows analysis of multiple projects and instances of each project type
- Creates Current and Expected Assumptions sheets and LCie sheets automatically
- Users can override the calculated Assumptions



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Program Short Form Variables

Variables	Value		
	PROJECT TYPE A	PROJECT TYPE B	PROJECT TYPE C
Program Variables			
Number of Projects	5	4	3
Scaling Variables			
Estimated Number of Pages in Facility Criteria	2	14	20
Estimated Number of Pages in Discipline Specification	43	400	549
Estimated Number of Pages in Project Definition	43	14	20
Estimated Number of Pages in Front Matter	25	50	25
Number of Space Types per Project	19	30	27
Number of Unique Product Types	50	155	85
Number of Tagged Components	1706	3950	534
Number of Pre-Design Submittal Sets Req'd.	4	4	2
Estimated Number of Sheets per Option	4	6	8
Estimated Number of Letter Sized Pages in Pre-Design Narrative per Option	10	10	10
Number of Design Submittal Sets Req'd.	6	6	3
Estimated Number of Letter- Sized pages in Design Narratives	20	60	40

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Can Industry Achieve These Savings?

Requirements

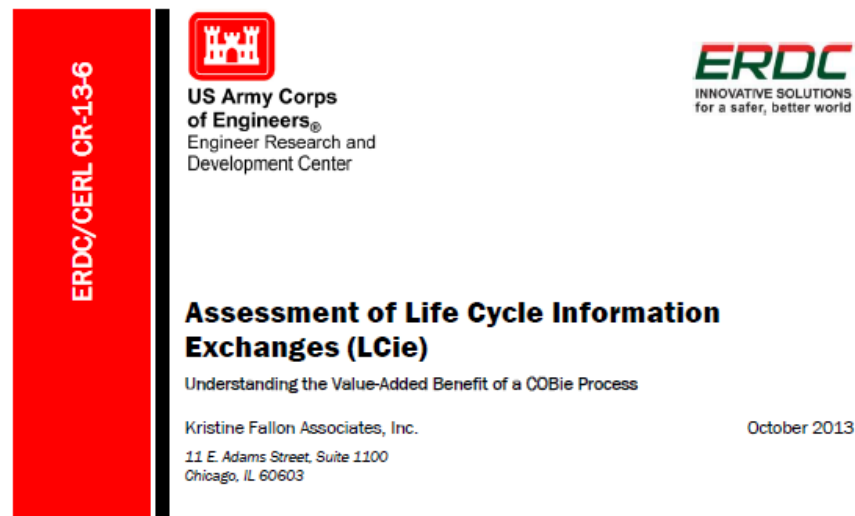
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- Software exists:
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 - To automate comparison of the contents of two COBie files:
 - Specification
 - Contractor's product data submittals
- Project managed in a project collaboration system with automated workflow and audit trail; paper eliminated

Reality

- Not yet – Designers and contractors need to create this data
- COBie export capabilities are variable; import capabilities mostly lacking
- Many do
- Automated checking software exists; often needs customization
- Semi-automated comparison exists
- This technology has been available for > 15 years

Availability

- COBie Calculator spreadsheets and experimental cost models:
 - www.nibs.org/?page=bsa_cobiecalc



- ***Assessment of Life Cycle Information Exchanges (LCie): Understanding the Value Added Benefit of a COBie Process:***
 - <http://acwc.sdp.sirsi.net/client/search/asset/1030580>



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Demonstration