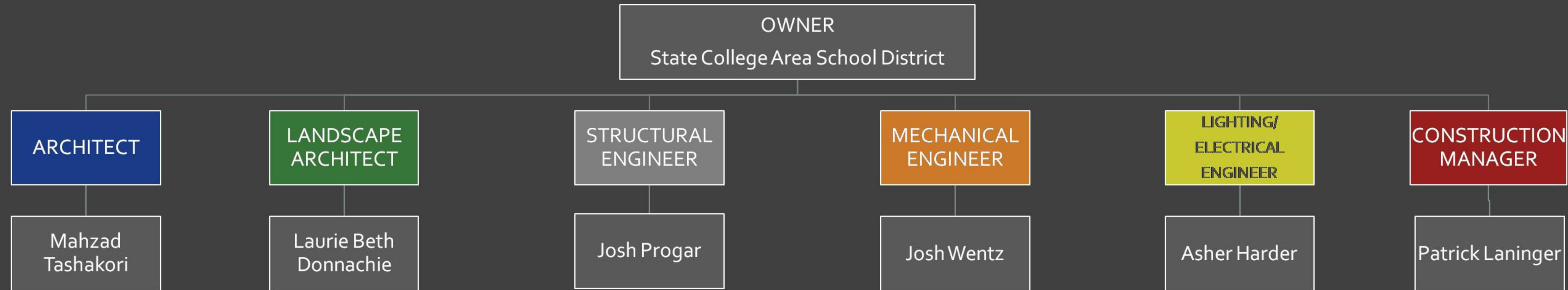




## team



# mission

**Creative.LOGIC** is dedicated to delivering **efficient, sustainable design** that maximize project value and minimize extraneous project expenditures. We strive to work **cooperatively** with owners and subcontractors alike in an effort to eliminate the traditionally adversarial atmosphere associated with the building construction process.

# details

# project

# deliverables

Brand New School

400 Students & Faculty

59,000 Gross SF

Achieve Minimum  
LEED Silver



Mt. Nittany Elementary School

656 Brandywine Drive  
State College, PA 16801

GMP/IPD Delivery Method Contract



SUBMITTAL	STAGE	DATE
Presentation #1: BIMex	Preliminary Planning	Jan. 27, 2011
Presentation #2: Schematic Design	Design Documents	Feb. 8, 2011
Presentation #3: Design Development	Design Documents	Mar. 3, 2011
Presentation #4: Final Project Presentation	Construction Documents	Apr. 24, 2011

*Building Information Modeling***DESIGN**

- 3D models are linked to assembly, fixture, and finish data to provide a comprehensive database of all aspects of the building

**CONSTRUCT**

- 3D coordination models are derived from the design model to assist in the effective management of tradesmen and their work

**LIFECYCLE**

- BIM presents the opportunity to effectively maintain as-built information, as well as provide owners with comprehensive Operations and Maintenance data

*Integrated Project Delivery***HISTORY**

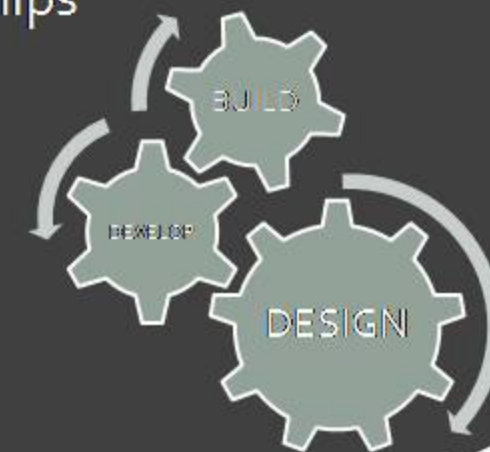
- Developed in mid-1990's by group of Orlando businesses
- Has taken some time to catch on

**BENEFITS**

- Promotes cooperation between design, engineering, tradesmen, and construction management professionals
- Centered around overall value of the final product
- Helps minimize adversarial relationships

**HURDLES**

- Shared risk
- Increase complexity
- Lengthened design process
- Financial market crash



DESIGN	CONSTRUCT
<b>Design Authoring</b>	<b>Site Utilization Planning</b>
<b>Design Review</b>	<b>Construction System Design</b>
<b>3D Coordination</b>	<b>3D Coordination</b>
<b>Structural, Mechanical, Lighting, Energy Analysis</b>	<b>Digital Fabrication</b>
<b>Sustainability (LEED) Evaluation</b>	<b>3D Control &amp; Planning</b>
<b>Code Validation</b>	→
<b>4D Modeling</b>	→
<b>Cost Estimation</b>	→
<b>Existing Conditions Modeling</b>	→

# use analysis

# BIM

# phased

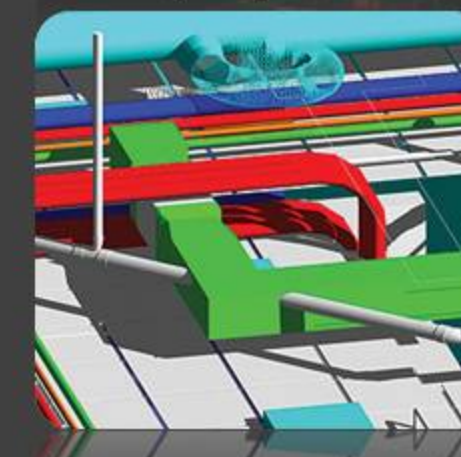
PRIORITY (HIGH/MED/LOW)	GOAL DESCRIPTION	POTENTIAL BIM USES
High	Maximize efficiency of design & coordination process	3D Coordination, Design Authoring
High	Minimize clashes both in frequency and severity on-site	3D Coordination, Design Reviews
High	Turnover the project on-time and at least on-budget	Cost Estimation
High	Perform design reviews in a virtual environment	Design Review
High	Utilize analytical programs to design a sustainable, energy efficient project.	Sustainability, Struct., Mech., Lighting Analysis
Medium	Utilize integrated multi-disciplinary software to learn capabilities	Design Authoring
Medium	To evaluate constructability and verify the feasibility of an aggressive schedule	4D Modeling, Design Reviews
Medium	Improve communication between all disciplines	3D Coordination

PRIORITY (HIGH/MED/LOW)	GOAL DESCRIPTION	POTENTIAL BIM USES
High	Maximize efficiency of design & coordination process	3D Coordination, Design Authoring
High	Minimize clashes both in frequency and severity on-site	3D Coordination, Design Review
High	Turnover the project on-time and at least on-budget	Cost Estimation, 4D Modeling
High	Perform design review in a virtual environment	Design Review
High	Utilize analytical programs to design a sustainable, energy efficient project	Sustainability, Struct., Mech., Lighting Analysis

	DESIGN		CONSTRUCT
X	DESIGN AUTHORIZING	M	SITE UTILIZATION PLANNING
X	DESIGN REVIEW		CONSTRUCTION SYSTEM DESIGN
X	3D COORDINATION	X	3D COORDINATION
M	STRUCTURAL ANALYSIS		DIGITAL FABRICATION
M	LIGHTING ANALYSIS		3D CONTROL AND PLANNING
M	ENERGY ANALYSIS		
M	MECHANICAL ANALYSIS		
	OTHER ENG. ANALYSIS		
M	SUSTAINABILITY (LEED) EVALUATION		
	CODE VALIDATION		
X	PHASE PLANNING (4D MODELING)	X	(4D MODELING)
X	COST ESTIMATION	X	COST ESTIMATION
	EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING



<http://www.yearout.com/>



<http://wm2s.com/4.html>

# use analysis

# BIM

# phased

PRIORITY (HIGH/MED/LOW)	GOAL DESCRIPTION	POTENTIAL BIM USES
High	Maximize efficiency of design & coordination process	3D Coordination, Design Authoring
High	Minimize clashes both in frequency and severity on-site	3D Coordination, Design Reviews
High	Turnover the project on-time and at least on-budget	Cost Estimation
High	Perform design reviews in a virtual environment	Design Review
High	Utilize analytical programs to design a sustainable, energy efficient project.	Sustainability, Struct., Mech., Lighting Analysis
Medium	Utilize integrated multi-disciplinary software to learn capabilities	Design Authoring
Medium	To evaluate constructability and verify the feasibility of an aggressive schedule	4D Modeling, Design Reviews
Medium	Improve communication between all disciplines	3D Coordination

PRIORITY (HIGH/MED/LOW)	GOAL DESCRIPTION	POTENTIAL BIM USES
Medium	Utilize integrated multi-disciplinary software to learn capabilities	Design Authoring
Medium	To evaluate constructability and verify the feasibility of an aggressive schedule	4D Modeling, Design Review
Medium	Improve communication between all disciplines	3D Coordination



<http://www.tekla.com/international>



X	DESIGN	X	CONSTRUCT
X	DESIGN AUTHORING	M	SITE UTILIZATION PLANNING
X	DESIGN REVIEW		CONSTRUCTION SYSTEM DESIGN
X	3D COORDINATION	X	3D COORDINATION
M	STRUCTURAL ANALYSIS		DIGITAL FABRICATION
M	LIGHTING ANALYSIS		3D CONTROL AND PLANNING
M	ENERGY ANALYSIS		
M	MECHANICAL ANALYSIS		
	OTHER ENG. ANALYSIS		
M	SUSTAINABILITY (LEED) EVALUATION		
	CODE VALIDATION		
X	PHASE PLANNING (4D MODELING)	X	(4D MODELING)
X	COST ESTIMATION	X	COST ESTIMATION
	EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING

# meetings

# communication

# decision making

*open minded & constant*

<b>TIMES</b>	Found 3 times in week we are all free
<b>LOCATIONS</b>	ICON Lab in Eng. Unit C Sackett Building, Room 307 Stuckeman Building, SCDC Lab
<b>MINUTES</b>	Scribed at End of Each Meeting: Meeting Topic, Date, Time, Place, Participants, Key Points, Next Meeting

<b>LIST-SERV</b>	bimstudio1@googlegroups.com
<b>WEBSITE</b>	<a href="https://sites.google.com/site/bimstudio1/">sites.google.com/site/bimstudio1/</a>
<b>DOCUMENTS</b>	Google Docs Shared Folder
<b>BIMex PLAN</b>	Dynamic & Real Time Google Doc Shared with all Disciplines
<b>Design Change?</b>	Issue Revision Form on Website

creative•LOGIC

- Home
- Contacts
- Minutes**
- Revision
- BIMex
- Docs

**Minutes**

\* Required

Scribe \* **form**

Scribe	Date, Time, Place	Participants	Key Points
Asher	1/20/2011 All		<ul style="list-style-type: none"> <li>- combined separate contributions for BIM ex plan</li> <li>- flagged sections for questioning (highlighted in red)</li> <li>- identified sections that we know needs revised (and delegat appropriate persons)</li> <li>(progar &amp; laurie) exchange points diagram: describing the flow lead/lag time, problems with graphic communication needs t flow of ideas, following a timeline graphic.</li> <li>(asher) information exchange chart: columns for bim use, res discipline and information needed.</li> <li>(mahzad) template for personal pages in presentation: color of page identify each discipline and work like dividers in a no highlight your discipline's color with a white line. design goal</li> </ul>

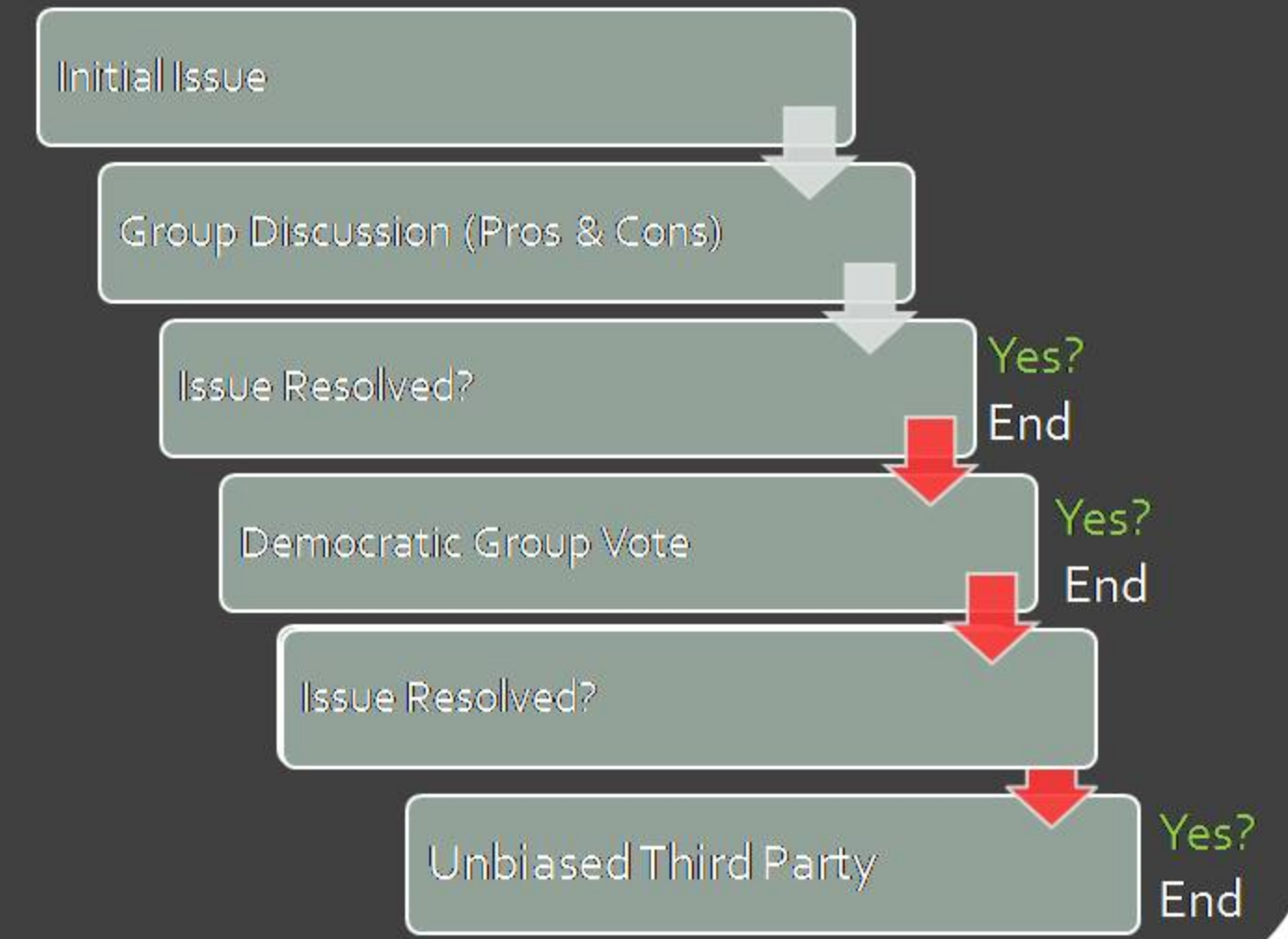
**spreadsheet**

creative•LOGIC

BIMex

[PROJECT TITLE] [DATE]

**editable anywhere, anytime**





# goals

- Sustainable and Efficient Design with Local and Natural Resources
- Decrease Data Exchange Time and Clashes Through Design
- Create Engaging Educational Space for Children, Parents and Teachers
- Accomplish Program Model Requirements
- Design a Aesthetically Pleasant while Functional Building



# design

## Mt. Nittany Elementary School



# precedence

**PROJECT PROFILE**

**ROSA PARKS ELEMENTARY SCHOOL**  
PORTLAND, OREGON

**24%** reduction in energy use

**31%** of building materials manufactured regionally

**97%** of construction waste diverted from the landfill

LEED® Facts	
Rosa Parks Elementary School Portland, Oregon	
LEED for New Construction Certification awarded August 20, 2007	
<b>Gold</b>	<b>42*</b>
Sustainable Sites	11/14
Water Efficiency	2/5
Energy & Atmosphere	6/17
Materials & Resources	6/13
Indoor Environmental Quality	12/15
Innovation & Design	3/3
*Out of a possible 69 points	

**FOSSIL RIDGE HIGH SCHOOL**  
FORT COLLINS, COLORADO

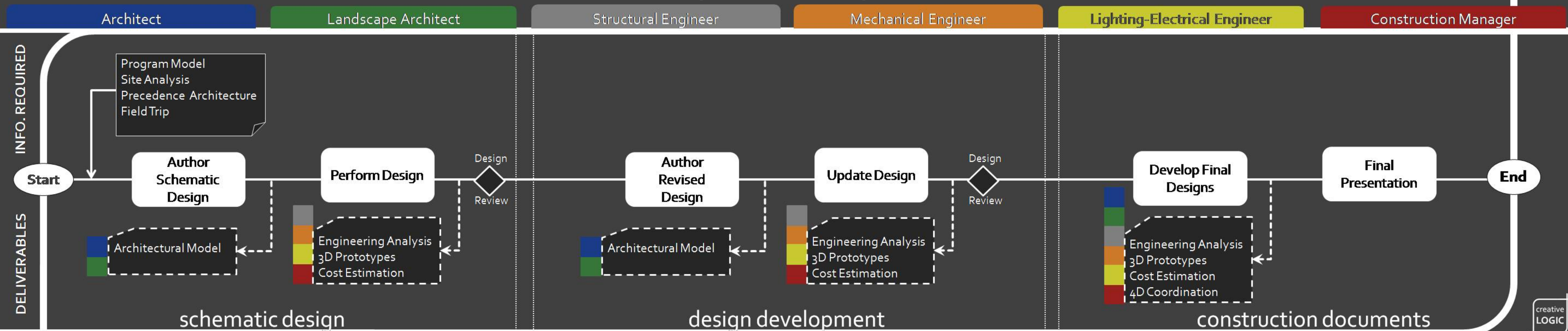
**60%** more energy efficient

**\$11,500** in annual water savings

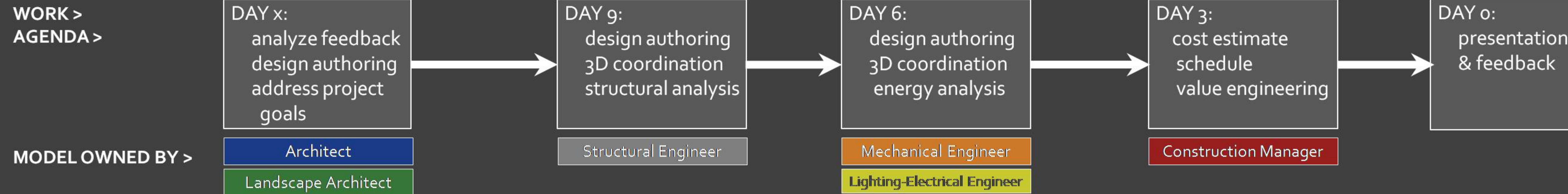
**\$0** additional cost for LEED

LEED® Facts	
Fossil Ridge High School Fort Collins, CO	
LEED for New Construction Certification awarded July 12, 2006	
<b>Silver</b>	<b>36*</b>
Sustainable Sites	2/14
Water Efficiency	1/3
Energy & Atmosphere	15/17
Materials & Resources	3/13
Indoor Environmental Quality	5/15
Innovation & Design	3/3
*Out of a possible 69 points	

# process map



# information exchange



Architect

Landscape Architect

Structural Engineer

Mechanical Engineer

Lighting-Electrical Engineer

Construction Manager

DESIGN GOALS >

BIM USES >

COORDINATION >

Sustainable Design

Design a Aesthetically Pleasant, Functional and Efficient Building

Create Engaging Educational Space for Children, Parents and Teachers

Provide Required Spaces based on the Program Model

Decrease Data Exchange Time and Clashes Through Design Procedure

Design Authoring, Design Review, 3D Coordination, Site Analysis

Design Authoring, Design Review, 3D Coordination, Sustainability

Design Authoring, Design Review

Design Authoring, Design Review

Design Authoring, Design Reviews, 3D Coordination, 4D Modeling



PROCESS MAP

INFO. REQUIRED >

Start

TASKS >

Program Model  
Weather Data & Site Analysis  
Precedence Documents  
Field Trip

Schematic Design

Design Review

Project Goals  
Sustainability Strategies  
Site Analysis Model  
General Pre-Design Studies  
Bubble Diagram Required Spaces in Scale

Design Ideas  
Conceptual Bldg. Layout  
MEP Schematic Design  
Constructability Strategies

Design Development

Design Review

Coordinate All Disdplines/  
Design Solutions  
Provide Preliminary Drawings and Provide Required Square Footage  
Create 3D Model

Developed Drawings+3D Model  
Site Design  
MEP Locations  
Structural Design  
Constructability Review

Design Authoring

Design Review

3D Coordination  
Stop Architectural Design Detailing  
Finalize Material, MEP and Structural Systems

Finalized Architectural Drawings  
Finalized 3D Model in Revit  
Finalized Structural Model  
Finalized MEP Locations  
Finalized Cost Estimation

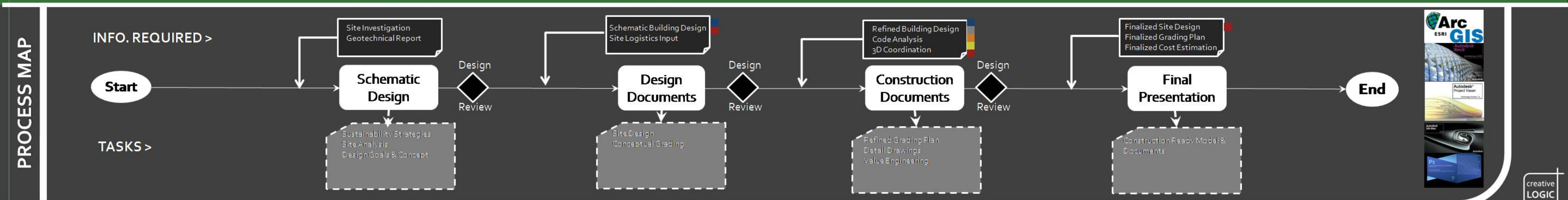
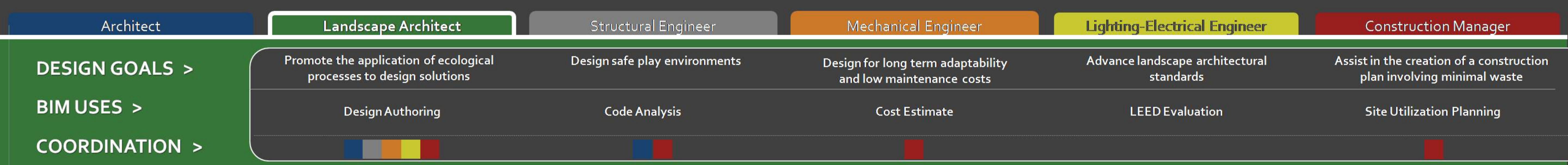
Final Presentation

3D Coordination  
Finalize Detailed Design Rendering  
Presentation Format

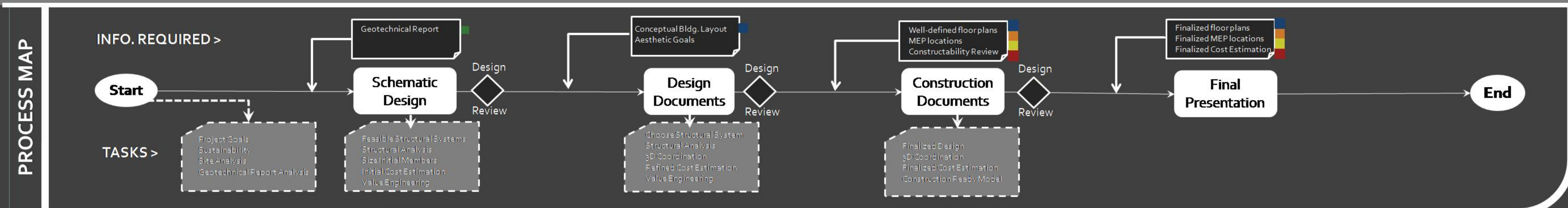
End



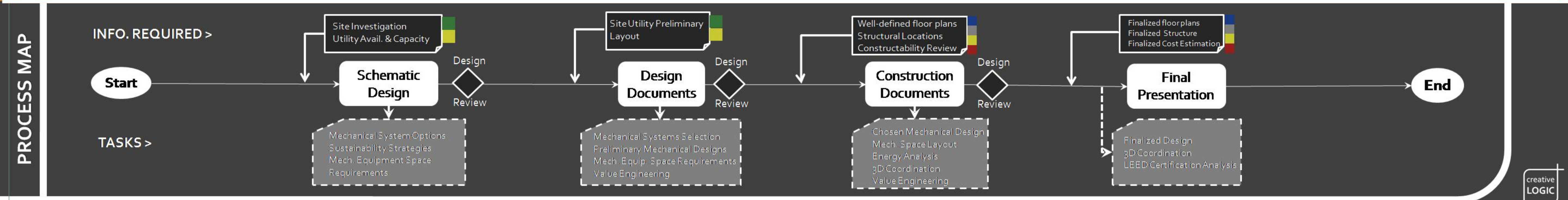
creative LOGIC



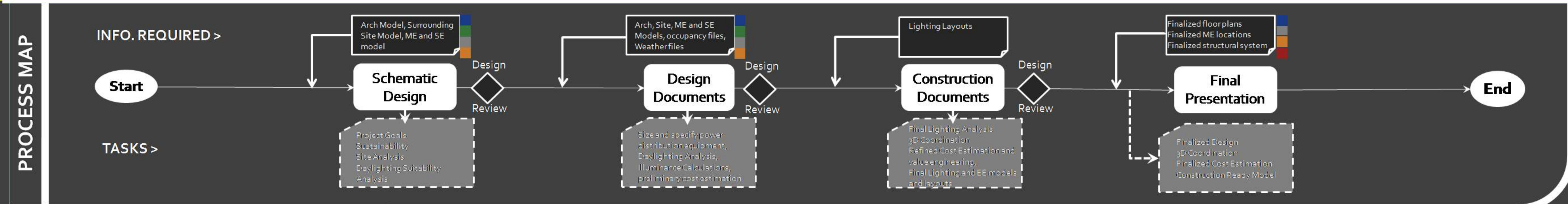
	Architect	Landscape Architect	Structural Engineer	Mechanical Engineer	Lighting-Electrical Engineer	Construction Manager
<b>DESIGN GOALS &gt;</b>		Efficient, cost-effective design	Utilize structural analysis computer programs to potential load cases	Satisfy all code regulations while maintaining an aesthetically pleasing building	Do not over-design the structure, but do not under-design to avoid litigation	
<b>BIM USES &gt;</b>		Design Authoring, Design Review, 3D Coordination, Structural Analysis	Structural Analysis	Design Authoring, Design Review	Design Authoring, Structural Analysis, Sustainability, Cost Estimation	
<b>COORDINATION &gt;</b>						



	Architect	Landscape Architect	Structural Engineer	Mechanical Engineer	Lighting-Electrical Engineer	Construction Manager
<b>DESIGN GOALS &gt;</b>	Efficient, Economical Systems	Create a sustainable, environmentally conscious design		Thermally Comfortable Environment	Ensure indoor air quality	Prevent built clashes between systems
<b>BIM USES &gt;</b>	Design Authoring, Design Review, Mechanical Analysis		Energy Analysis	Design Authoring, Design Review	Sustainability	Design Authoring, Design Review, 3D Coordination
<b>COORDINATION &gt;</b>						

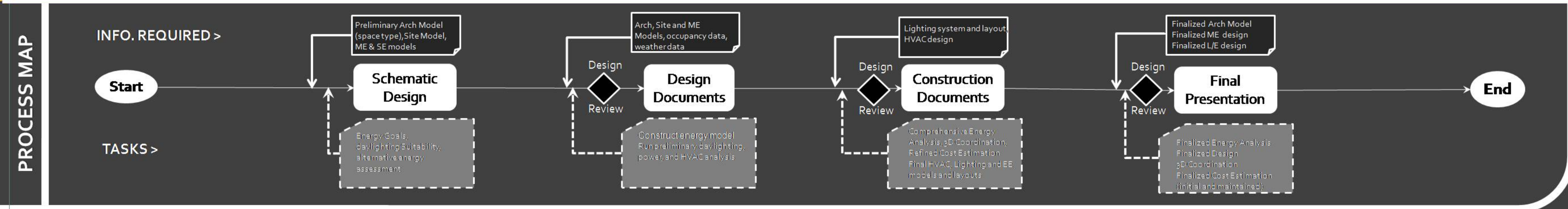


	Architect	Landscape Architect	Structural Engineer	Mechanical Engineer	Lighting-Electrical Engineer	Construction Manager
<b>DESIGN GOALS &gt;</b>		High efficiency lighting and electrical systems	Effective integration of of daylighting	Aesthetically Pleasing, integrated lighting design	Provide recommended light levels	Facilitate the supply of safe power to the facility
<b>BIM USES &gt;</b>		Energy Analysis, Sustainability (LEED) Evaluation	Building System analysis, 3D Coordination	3D Coordination	Building System Analysis	Code Analysis
<b>COORDINATION &gt;</b>						

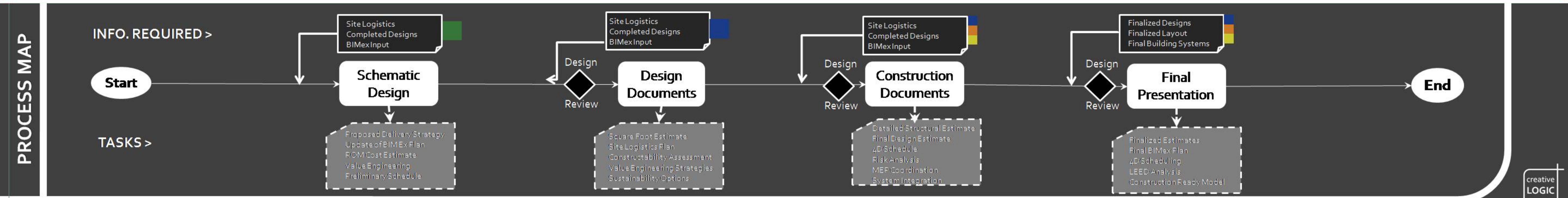




	Architect	Landscape Architect	Structural Engineer	Mechanical Engineer	Lighting-Electrical Engineer	Construction Manager
<b>DESIGN GOALS &gt;</b>		High efficiency Mechanical, Lighting, and Electrical Systems	Integration of Architectural forms, lighting, and HVAC equipment	Optimize the building system as a whole, not individual disciplines	Facilitate the supply of clean air and safe power to the facility	
<b>BIM USES &gt;</b>		Energy Analysis, Sustainability (LEED) Evaluation	3D Coordination	Building System Analysis	Code Analysis	
<b>COORDINATION &gt;</b>		Integrated Energy efficient systems		Energy Analysis		



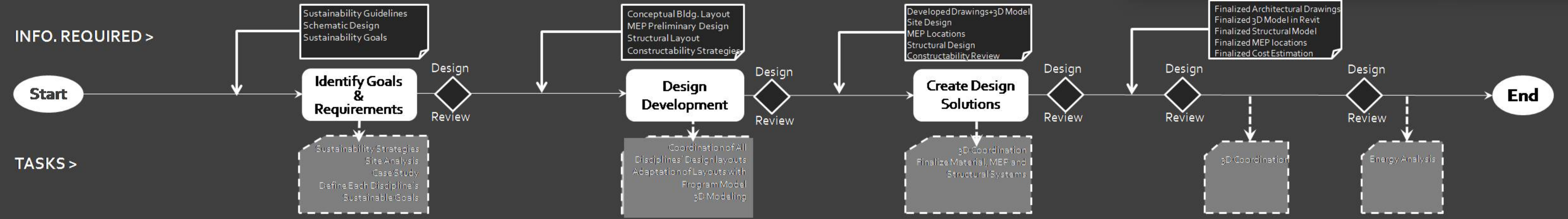
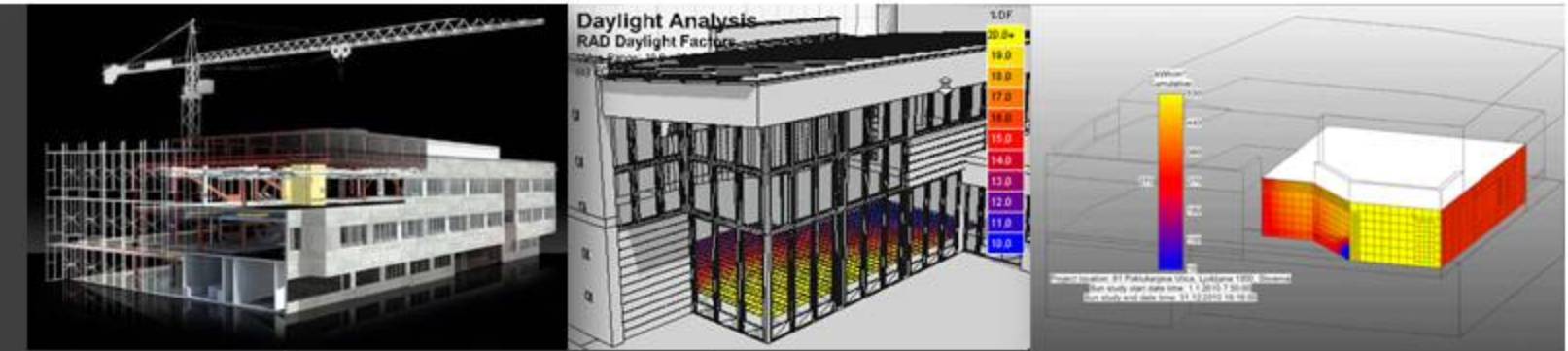
	Architect	Landscape Architect	Structural Engineer	Mechanical Engineer	Lighting-Electrical Engineer	Construction Manager
<b>DESIGN GOALS &gt;</b>	Highly constructible, efficient, cost-effective and easily maintainable design	Minimize system overdesign	Ensure systems meet owner and local code requirements	Maximize performance and efficiency of final product	Maximize schedule and project phasing efficiency	
<b>BIM USES &gt;</b>	Design Authoring, Design Review, 3D Coordination, Cost Estimating	Structural Analysis	Design Authoring, Design Review	Design Authoring, System Analysis, Sustainability Evaluation, Cost Estimation	4D Scheduling	
<b>COORDINATION &gt;</b>						



# sustainability with BIM/IPD

- IPD (Integrated Project Delivery)
  - Promotes **Interdisciplinary Coordination** of Sustainable Efforts
  - Ensures **In Unison Performance** of All Systems and the Overall Efficiency
  - **Prevents Overdesigning** and Excess Resource Usage

- BIM Helps Expedite the Coordination Process
  - Effect of each Discipline's **Design Changes**
  - Energy Modeling to Better Address **Energy Issues**
  - Structural Analysis for Efficient Use of **Material**
  - 4D Scheduling to Limit Excess **Expenditures**



## BIMex thoughts

## summary

## references

## STRONG POINTS

- Helped pinpoint potential BIM uses for the project
- Clearly defined and laid out the BIM management process
- Established a logical flow of information that will increase project efficiency

## WEAK POINTS

- Utilizing alternative means of maintaining effective communication
- Redundancy of material

*the creative.LOGIC way*

Dynamic, real-time BIMex Plan (Google Doc)  
 [Continuous interdisciplinary information feed]  
 + Unique conflict resolution techniques  
 = Enhanced team building design capabilities &  
 Collaborative Atmosphere

## ULTIMATE GOAL

Create a building design that capitalizes on high performance, efficiency, and value to the owner.

## OUTSIDE RESOURCES

BIM Project Execution Planning Guide -  
<http://www.engr.psu.edu/ae/cic/bimex/index.aspx>

## IMAGES

[www.yearout.com](http://www.yearout.com)  
[www.continuingeducation.construction.com](http://www.continuingeducation.construction.com)  
[www.tekla.com/international](http://www.tekla.com/international)  
[wm2s.com/4.html](http://wm2s.com/4.html)

thank you

The logo features the words 'creative' and 'LOGIC' in a white, sans-serif font. 'creative' is in lowercase and 'LOGIC' is in uppercase. The text is enclosed within a white, rounded rectangular frame that has a thin horizontal line extending from the top and bottom, and a thin vertical line extending from the left and right, creating a cross-like shape around the text.

creative  
LOGIC

questions?