



## PARALLEL SESSION STREAM

Key enablers to generate value in the  
construction industry

**Towards the Future**

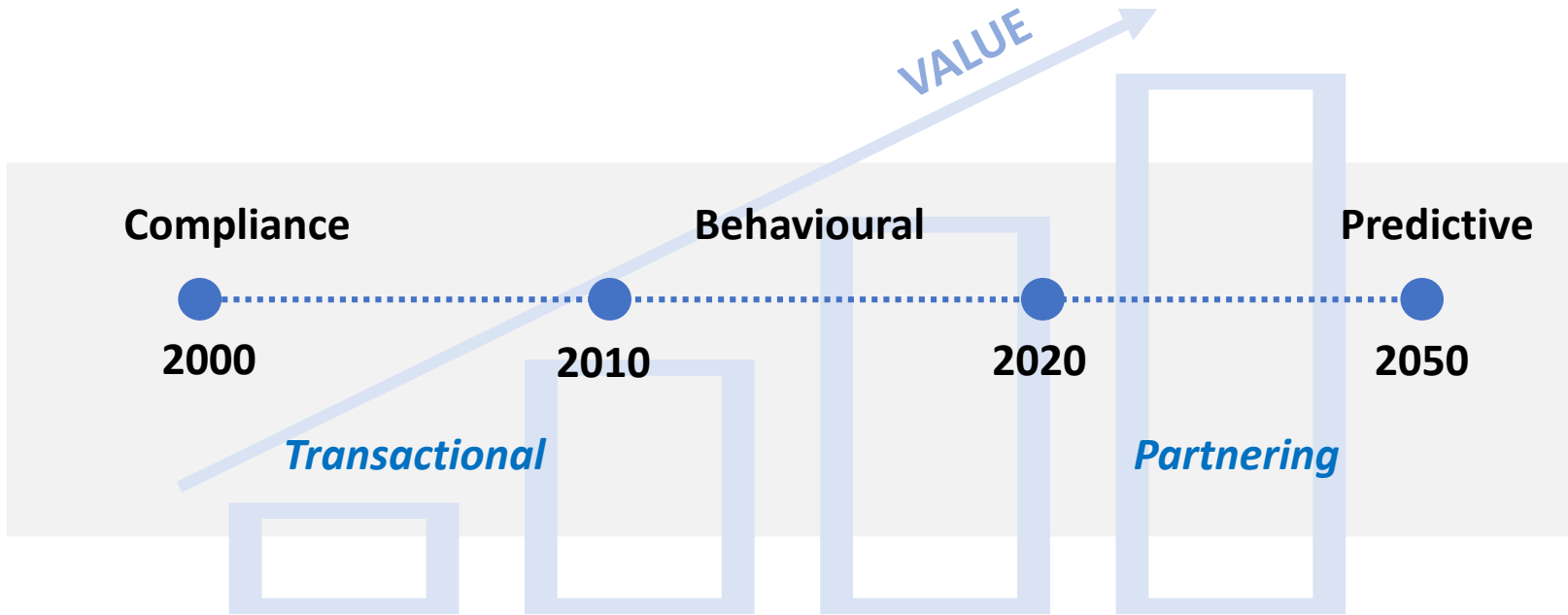
Patricia A. Tillmann  
Sr. Lean Manager  
The Boldt Company

# INTRODUCTION

- 2006 . Architect and Urbanist . Customer Satisfaction
- 2008 . Masters in Construction Management . Value generation
- 2012 . PhD in Construction Management . Value generation
- 2013 . Post Doctoral Scholar . Integrated Project Delivery
  
- 2014 . HVAC Contractor . Production Manager
- 2016 . University of California . Sr. Manager Lean Project Delivery
- 2020 . The Boldt Company . Sr. Manager Lean Project Delivery



# EVOLUTION OF VALUE MANAGEMENT AND PROJECT DELIVERY METHODS TO IMPROVE PROJECT OUTCOMES



# LESSONS LEARNED FROM INRASTRUCTURE PROJECTS IN BRAZIL . 2000



14.700 direct beneficiaries

- Improved quality of life
- Social inclusion
- Access to housing, sanitation
- Income generation
- Access to schools and education
- Environmental recovery of protected area

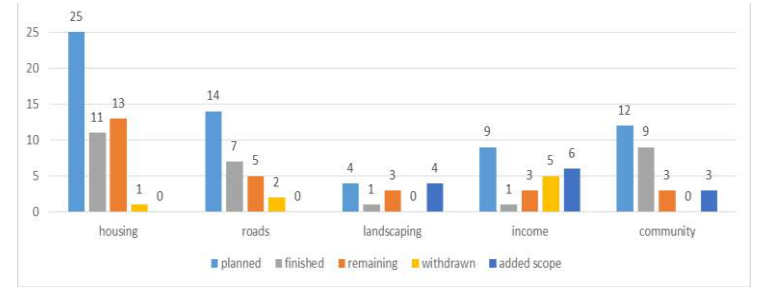
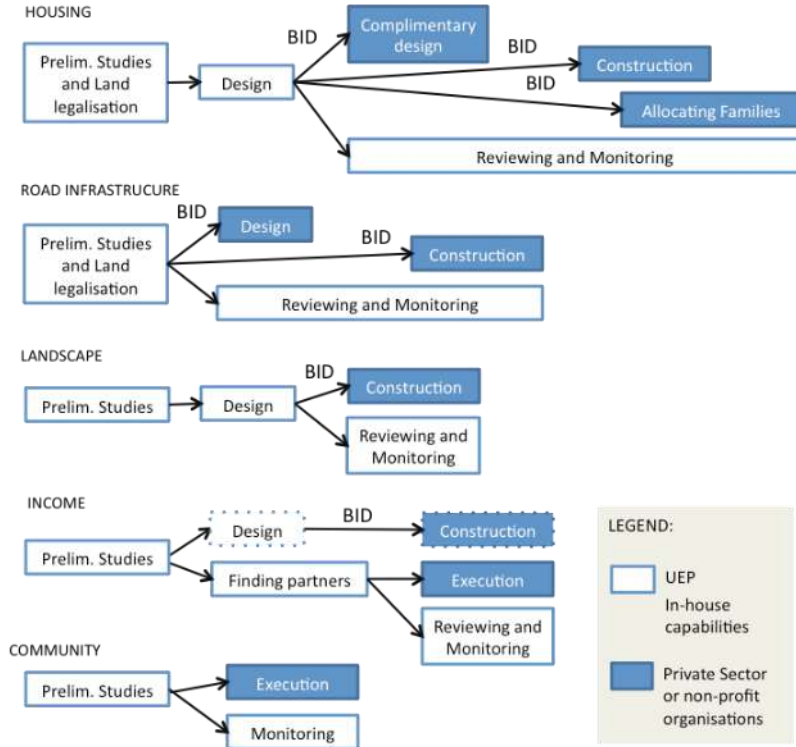


## VM TOOL: LOGICAL FRAMEWORK APPROACH

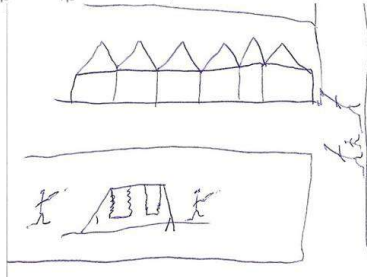
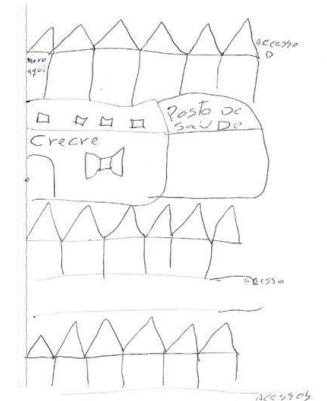
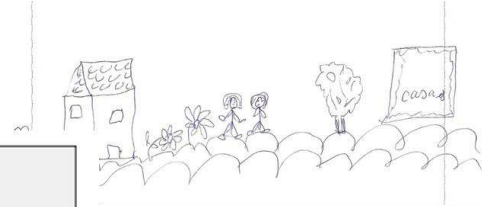
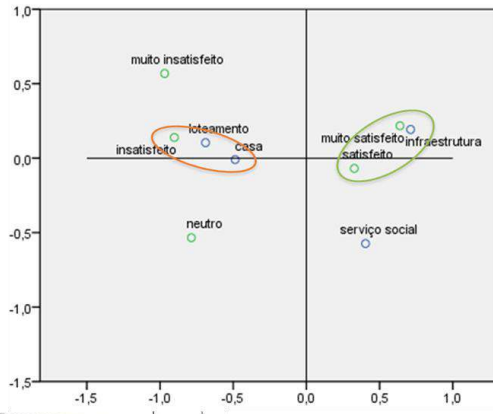
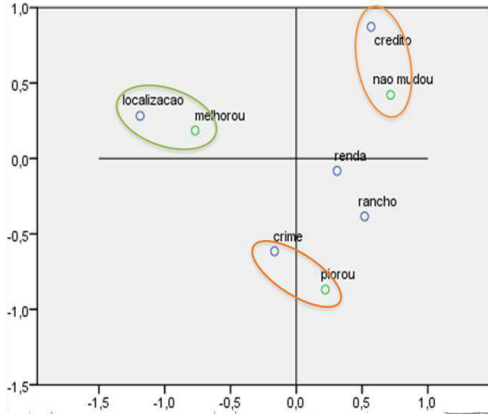
Programme overall goal: Improve the quality of life of a target community living in three neighbourhoods					
Housing		Road infrastructure	Landscaping	Income generation	Community development
Projects overall objectives: Provide urban infrastructure and environmental recovery					
Objectives	Improve living conditions	Provide adequate urban infrastructure	Provide aesthetic value/leisure places	Opportunities to generate income	Support community development
Components	1. Provide area to build housing and places for income generation	1. Analyse needs for road connectivity	1. Reform and improve existing leisure areas	1. Build waste sorting units	1. Community organisation
	2. Build housing schemes and places for public health/education services	2. Provide area to build new roads		2. Build the centre for economic development CDR	
	3. Allocate families in new housing schemes	3. Build new roads 4. Build drainage system	2. Build new leisure areas	3. Establish the cooperative CONSTRUSOL	2. Social political actions



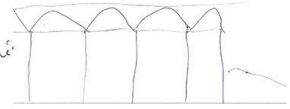
# PROJECT DELIVERY METHOD



# Impact Evaluation (2008 – 10 years later)



Muita Violência sem  
Segurança Mortes nas locais



## KEY LESSONS LEARNED

### Value concept and management practice:

- Value seen as impact on society – income generation, right of living in formal society, inclusion, decrease in diseases due to sanitation, access to education
- Logical framework approach used to plan and monitor progress
- Plan, design – Execute approach without much flexibility to accommodate changes.

### Project delivery method:

- Fragmented & Sequential – value decreased in each step, lack of synchronism in the implementation of multiple projects
- Low bid approach – rework, withdraws, inefficiency, additional \$ and time





## LESSONS LEARNED FROM HEALTHCARE PROJECTS IN ENGLAND . 2010

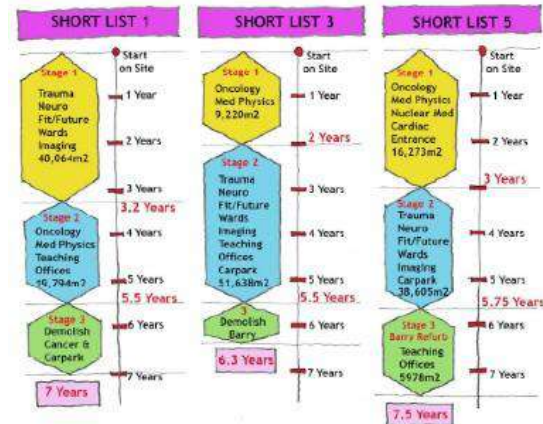


- Improved clinical outcomes
- Strategic fit (i.e., service co-location, use of resources)
- Increased access to services
- Improved training, teaching and research capabilities
- Improved development and implementation



# VM TOOLS: BENEFITS REALIZATION & SET BASED DESIGN + (BIM & DATABASE OF STANDARDS)

	Benefits Criteria	Weight	No. of People Scored	Options/Scores					Weighted Options/Scores					
				1	3	5	Do Min A	Do Min B	1	2	3	Do Min A	Do Min B	
<b>1</b>	<b>Strategic Fit</b>	<b>13.4</b>												
1.1	Stakeholder Engagement	2.7	33	8.76	6.73	6.15	0.70	1.88	23.46	18.02	16.48	1.87	5.03	
1.2	Context	2.7	35	8.71	7.03	5.94	3.29	1.63	23.34	18.83	15.92	8.80	4.36	
1.3	Research Alignment	2.7	31	7.94	6.84	5.58	0.74	1.26	21.26	18.32	14.95	1.99	3.37	
1.4	Synergy	3.6	33	8.42	6.67	6.15	1.27	2.03	30.09	23.81	21.97	4.55	7.25	
1.5	Image & Reputation	1.8	35	8.80	6.74	5.91	1.03	1.69	15.71	12.04	10.56	1.84	3.01	
<b>2</b>	<b>Clinical Outcomes</b>	<b>17.9</b>												
2.1	Co-location	5.4	34	8.53	6.26	6.15	0.74	1.50	45.69	33.56	32.93	3.94	8.04	
2.2	Reduce unnecessary patient attendances	1.8	28	8.36	6.89	5.43	1.14	1.96	14.92	12.31	9.69	2.04	3.51	
2.3	Improved quality of care	5.4	33	8.39	7.24	6.61	0.97	1.79	44.97	38.80	35.39	5.19	9.58	
2.4	Improved care outcomes	5.4	32	8.00	7.09	6.50	1.13	1.81	42.86	38.00	34.82	8.03	9.71	
<b>3</b>	<b>Appropriate Facilities (and Facilities Management)</b>	<b>25.0</b>												
3.1	Fit-for-purpose building and infrastructure	3.6	35	8.34	6.57	5.97	0.94	1.60	29.80	23.47	21.33	3.37	5.71	
3.2	Flexibility and future development of facilities	2.7	33	8.12	6.18	5.55	2.12	2.48	21.75	16.56	14.85	5.68	6.66	
3.3	Physical distribution of service locations (layout)	3.6	37	8.11	6.46	6.43	0.95	1.57	28.96	23.07	22.97	3.38	5.60	
3.4	Improved support services	1.8	19	8.00	7.11	6.74	1.21	2.05	14.29	12.69	12.03	2.16	3.67	
3.5	Increased patient safety	5.4	27	8.19	7.19	6.59	1.19	2.07	43.85	38.49	35.32	6.35	11.11	
3.6	Greater privacy (by better design)	3.6	31	8.71	7.81	7.16	1.29	1.90	31.11	27.88	25.58	4.61	6.80	
3.7	Backlog maintenance	0.9	22	8.45	7.64	4.77	0.86	1.77	7.55	6.82	4.26	0.77	1.58	
3.8	Better working environment	3.6	32	8.78	7.72	6.72	1.19	1.97	31.36	27.57	24.00	4.24	7.03	
<b>4</b>	<b>Access to Services</b>	<b>10.7</b>												

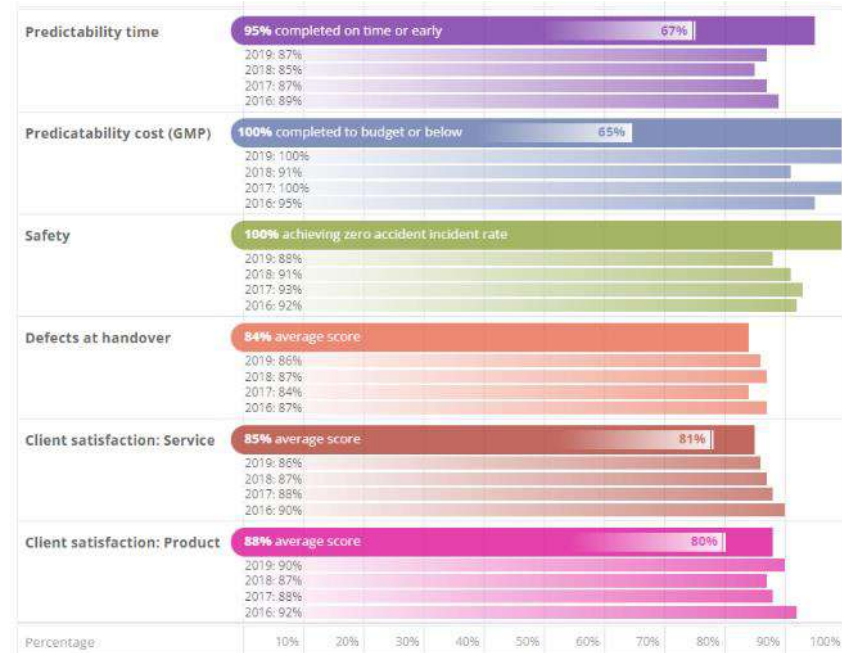


# PROJECT DELIVERY METHOD

## Key Characteristics:

- Highly scrutinized process - OGC (ROI/Benefits).
- Pre-qualified industry partners (Procure 21 Club).
- P21 include concentrated efforts to standardize (library of typical rooms and components), introduce efficiency with BIM and innovate to maximize value delivery.
- Partners engaged early – encompasses both design and construction
- Integrated supply chain
- Procurement process is standard, assessed and improved through time

## Snapshot of UK's Public Procurement KPIs:



## KEY LESSONS LEARNED

### Value concept and management practices:

- Value seen as impact on service outcomes and society
- Benefits Realization approach used to plan and monitor progress
- Dedicated workstream to deal with modernization and technology integration
- 3D model used as a boundary object
- Owner's shared database of standards - proven design solutions and innovations that lead to expected outcomes

### Project delivery method:

- Integrated supply chain through Procure 21 - procurement method developed, standardized, assessed and improved.
- Pre-qualification of suppliers – P21 Club (shared resources)
- Early engagement – from investment appraisal & design development to construction



# LESSONS LEARNED FROM HEALTHCARE PROJECTS IN THE US

**SCHEDULE**  
27 Months Market  
22 Months Actual

**COST**  
Initial Estimate: \$220M  
**Actual Cost: \$176M\***  
Market cost: \$200M\*  
\*Includes \$7M Additional Scope

**AKRON CHILDREN'S HOSPITAL**  
Akron, OH

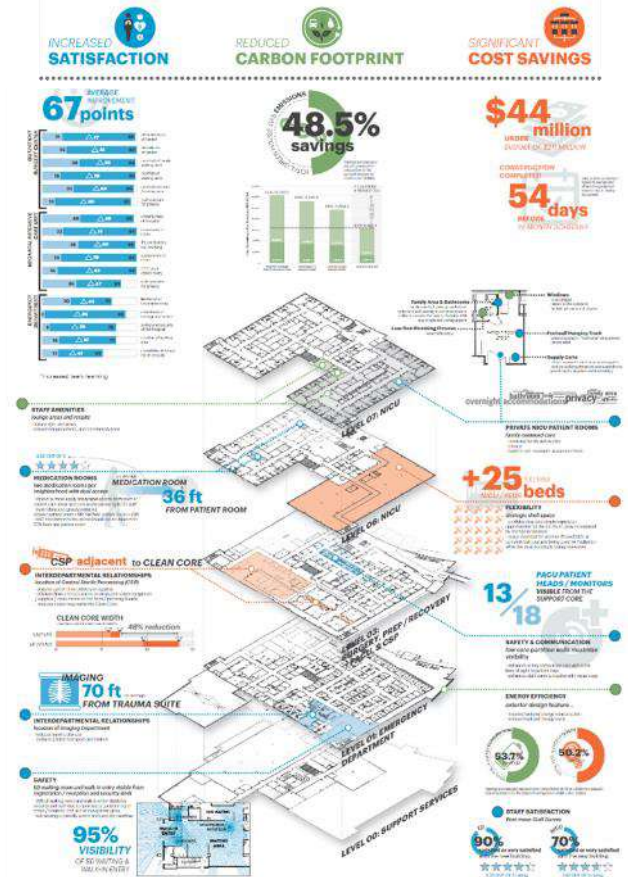
**380,000 sq. ft. 7-story Bed Tower**

"The integrated lean design approach helped Akron Children's realize cost and space savings that have enabled additional technology and resource investments throughout the project facility."  
— Grace Wukolchik.

**PRODUCT AWARDS**  
The Association of Energy Engineers  
LEED Gold  
WELL Building Standard®

**Aurora Health Care**  
We are AdvocateAuroraHealth

**BOLDT**



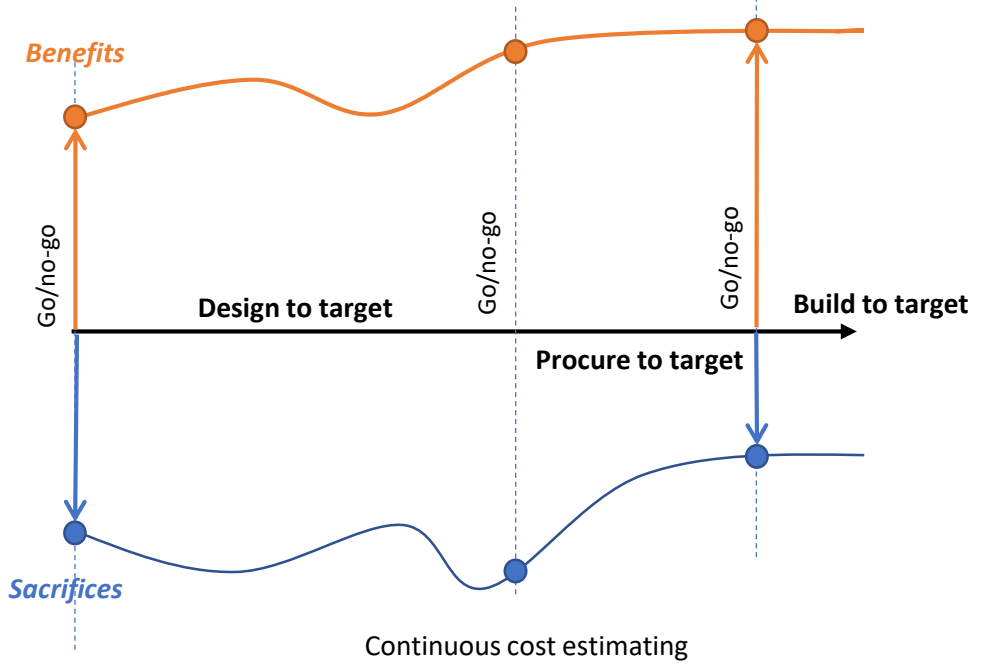
# VM TOOL: TARGET VALUE DESIGN

## TARGET VALUE DESIGN AT-A-GLANCE



- BIG IDEAS**
- Component/Innovation Teams
  - Early Trade Partner Involvement
  - Big Room
  - Consider Multiple Solutions (Set Based Design)
  - Budget Influences Design
  - Design for Optimal Production
  - Do Not Impose Your Values onto the Customer
  - Transparent Estimating
  - Built in Reflection & Learning Focused on Eliminating Waste

## Set-based design & Choosing by advantages



Business planning  
 Benchmark assessment & Plan Validation  
**Set Target**



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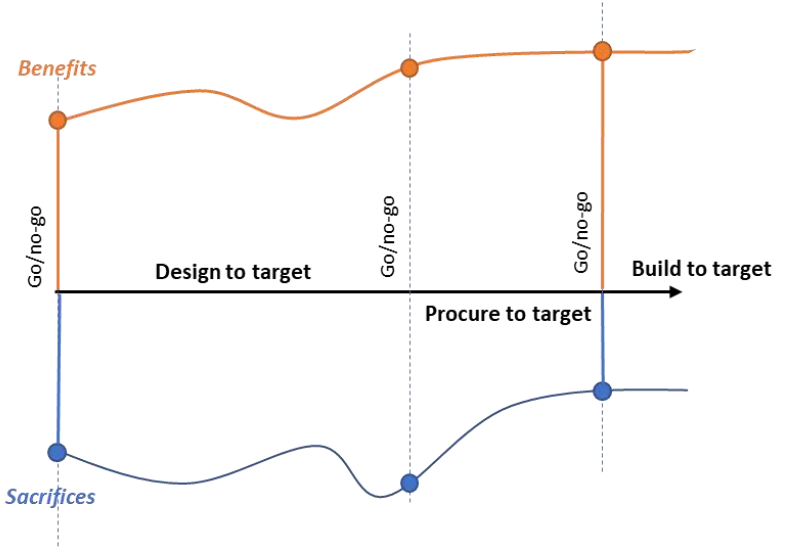
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ملتقى دبي العالمي  
 لإدارة المشاريع  
 DUBAI INTERNATIONAL  
 PROJECT MANAGEMENT FORUM

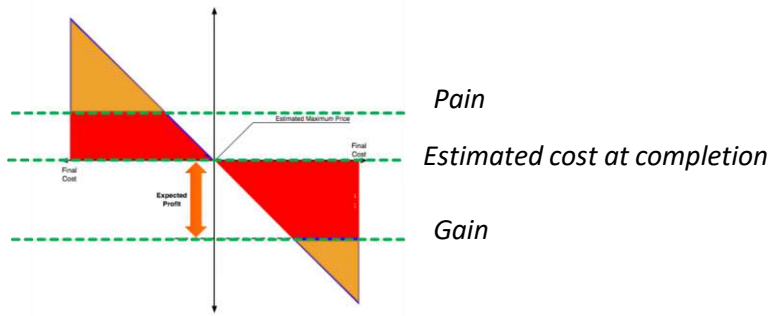


# PROJECT DELIVERY METHOD: INTEGRATED PROJECT DELIVERY

## Early engagement



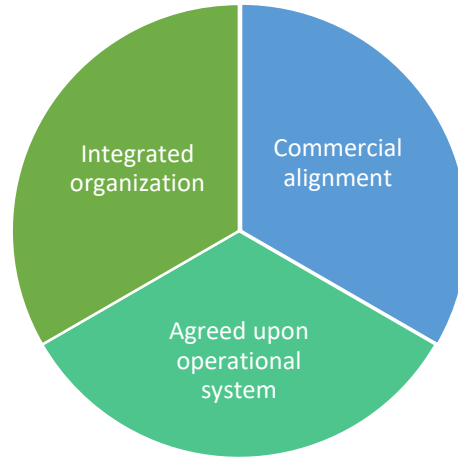
## Shared risks and rewards



Plan Validation  
Target Setting

# PROJECT DELIVERY METHOD: INTEGRATED PROJECT DELIVERY – KEY MECHANISMS AND TOOLS

- Early engagement of key partners
- Other partners are jointly selected
- Owner is part of the team
- Limited liability
- Co-location
- Intentionally built culture focused on a mission to deliver value through collaboration and teamwork



- Plan is validated collectively
- Risks and rewards are shared
- Open book financials
- Integrated governance
- Best for the project decision-making
- Profit depends on overall project performance

- Management system is agreed upon or co-developed
  - Target Value Design (w/ continuous cost estimating)
  - Set based design and data-based decision-making
  - Well defined decision-making route and route for escalating and solving issues
  - BIM as a boundary object





# PROJECT DELIVERY METHOD – IPD + TECHNOLOGY

## Integrated Project Delivery with BIM

Integrated project delivery (IPD) is the emerging standard for early collaboration and effective decision making in the building industry today. Incorporating a building information modeling (BIM) toolset into any aspect of the IPD process enables project teams to use information in an integrated environment, increasing efficiency and enabling new ways of working that inspire more creative and sustainable designs.

### Keys to Integrated Project Delivery

- Involve all team members in design meetings, including contractors.
- Institute building information modeling.
- Facilitate collaboration.
- Set up contract mechanisms that enable open collaboration.
- Minimize paper-based processes, and collaborate digitally.
- Check for and manage interferences between trades, digitally.
- Create a culture of trust and sharing.
- Communicate design ideas using 3D visualization to keep everyone aligned.



### PROJECT PHASES



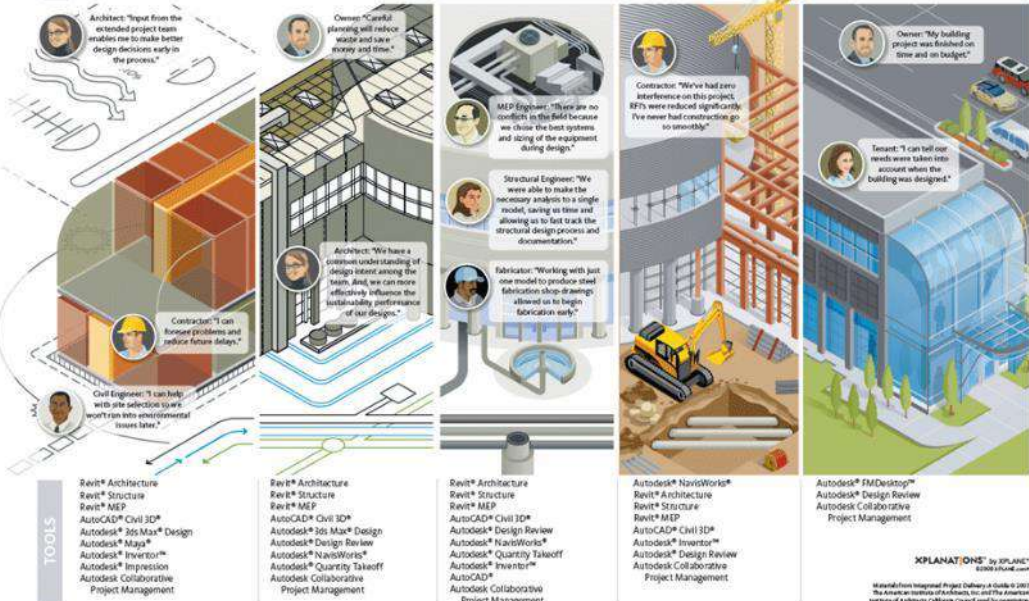
**CONCEPTUALIZATION** The project team comes together at the earliest stage, improving accuracy of decisions. The rest of the process becomes more predictable, thus avoiding costly redesign work.

**DESIGN** Collaboration between the architect, contractor, and engineers allows for better decision making, helping to improve quality and mitigate risk.

**IMPLEMENTATION DOCS** Predict virtual models are automatically part of the design, helping to reduce uncertainty in documents and interferences during construction.

**CONSTRUCTION** Because of careful early planning, team members are able to use materials efficiently, creating less waste. Change orders are minimized, and no operational revenue is lost. Construction can be completed on schedule and on budget.

**OWN / OPERATE** Owners can enjoy better quality assurance on their completed project and are pleased with a complete virtual building for operational and renovation purposes.



**EXPLANATIONS** by SPL\_PACIFIC  
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## KEY LESSONS LEARNED

### Value concept and management practice:

- Value seen as impact on service outcomes and society.
- Inspiring team to achieve a mission without losing awareness of costs.
- Target Value Design approach used to plan and monitor progress of benefits realization and estimated cost at completion.
- BIM as a boundary object. New capabilities of simulating and predicting behaviours with technology.

### Project delivery method:

- Integrated Project Delivery.
- Pre-qualification of key suppliers (in the public sector).
- Early engagement, co-location, integrated governance (focus on service rather than delivery of a product).



# EVOLUTION OF VALUE MANAGEMENT AND PROJECT DELIVERY METHODS TO IMPROVE PROJECT OUTCOMES

## FROM

- Understanding value as projects delivered to **specification, time and cost.**
- Performance Indicators focused on progress, schedule, cost.
- Plan vs. Execute mentality with little flexibility to change plan
- **Lowest-bid as delivery method**
- Adversarial relationships among contractors

## TO

- Understanding value as a **multi-faceted concept.**
- Improved VM methods, i.e. benefits realization, target value design, dedicated workstreams, intensive collaboration, integrated project organization, boundary objects
- **Relational contracts** i.e. alliance, IPD, etc.
- Commercial **alignment**
- Plan validation
- Increased flexibility
- **Co-created** management systems  
Intentionally built culture focused on a mission

## THE FUTURE

- “Improved toolbox”
- **Increased ability to predict** performance and understand what it takes to realize benefits
- Geographically dispersed but **integrated project teams** that are **inspired and well equipped** to make a difference in our planet



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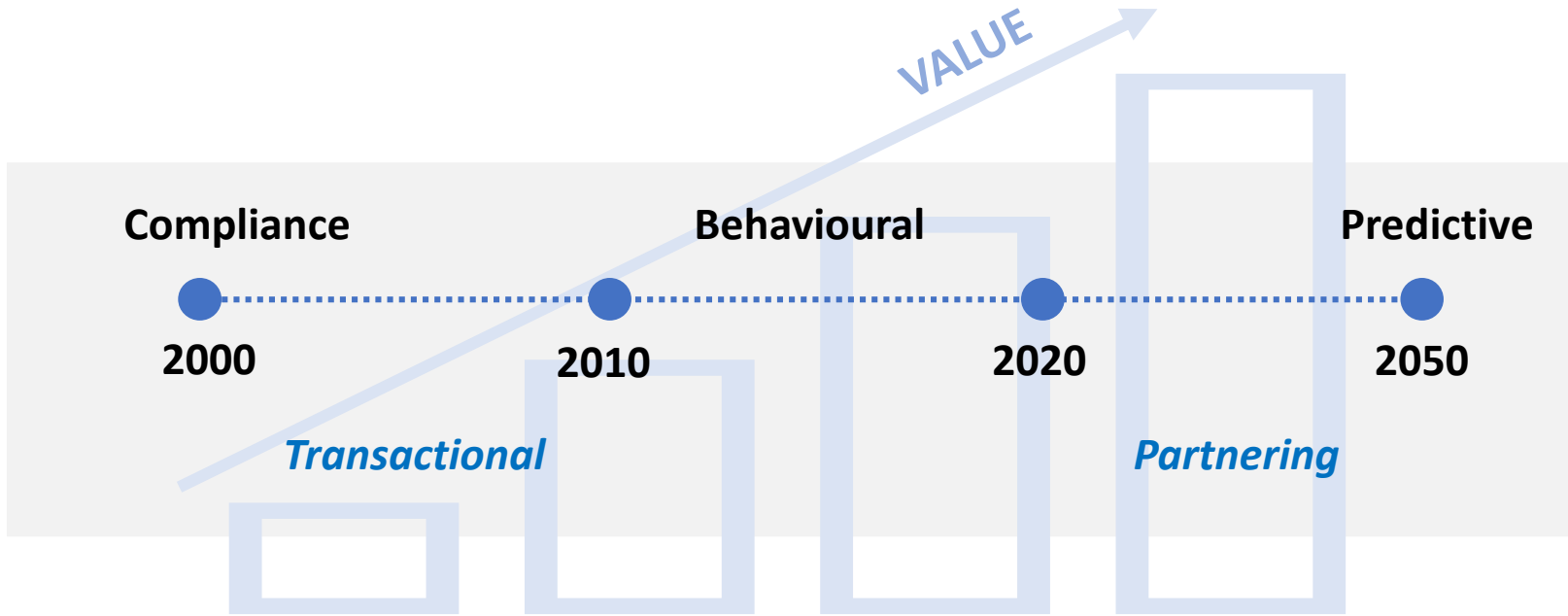
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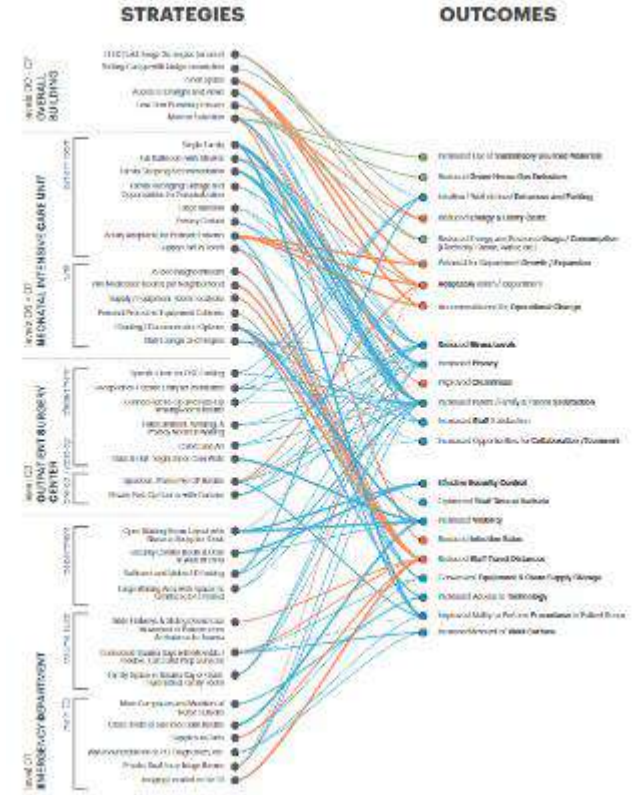




# TOWARDS THE FUTURE - EVOLUTION OF VALUE MANAGEMENT PRACTICES

Evolution of value management practices in construction:

- **1950 - 2000** . Post occupancy evaluations . Quality Function Deployment . Design Quality Indicator.
- **2000 - 2020** . Value Management (multi-stakeholder environment) . Benefits Realization . Target Value Design.
- **2020 – 2050** . Generative design . Predictive performance . Increased simulation capabilities.



# TOWARDS THE FUTURE - EVOLUTION OF SUPPLY CHAIN TO SUPPORT VALUE

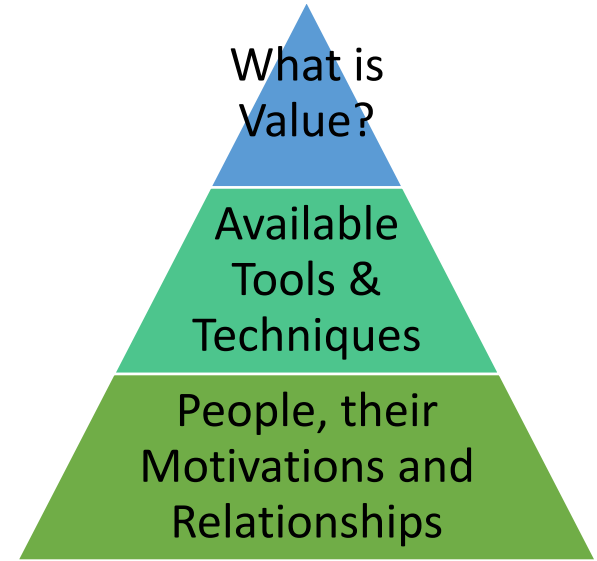
Implications for construction supply chain:

- **1950 - 2000** . Focus on discipline of design-architecture
- **2000 - 2020** . Integrated Project Delivery Methods.
- **2020 – 2050** . **Integrated Supply Chain . Distributed .**  
**Additional players . Aided by technology.**



## KEY TAKE AWAYS

- Understanding of **value concept** is evolving
  - Expanding from building itself into its impact on society and planet. Success indicators go way beyond cost, schedule and meeting specifications.
- Understanding of **value management techniques** is evolving
  - More flexibility, greater ability to predict and accommodate change. An improved toolbox emerge in this data-driven era.
- Understanding of **project delivery methods** is evolving
  - More and more alternative methods are shaped to tap the potential of integrated teams and provide them with support (and removing barriers) to deliver the extraordinary.





## RESOURCES

### Topics:

Integrated project delivery

Target value delivery

Set based design and Choosing by advantages

### Books:

Integrating project delivery

Target value delivery

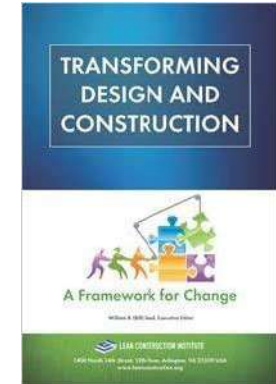
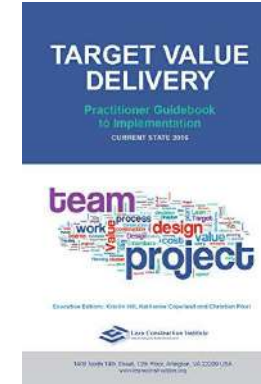
Transforming design and construction

### Websites:

<https://leanipd.com/>

<https://leanconstructionblog.com/index.html>

<https://iglc.net/>



THANK YOU

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