DOE Front End Planning (FEP) and Project Definition Rating Index (PDRI)

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In 2017, I asked you….

what if I could?

what if…

6 to 25%

average cost savings through effective front end planning

6 to 39%

average schedule savings through effective front end planning

what if…

3 - 10:1

average return through effective front end planning

what if…

I could bring 1000s of years of industry and government experience with me on each project?

par·a·digm

"a typical example or pattern of something; a pattern or model”

–Oxford English Dictionary

“the set of practices that define a scientific discipline at any particular period of time”

–Thomas Kuhn

3

big ideas

build the right project

scope the right things

set the stage for successful execution

1.5 - 5%

average cost of effective front end planning depending on type and complexity

Front End Planning (FEP)…

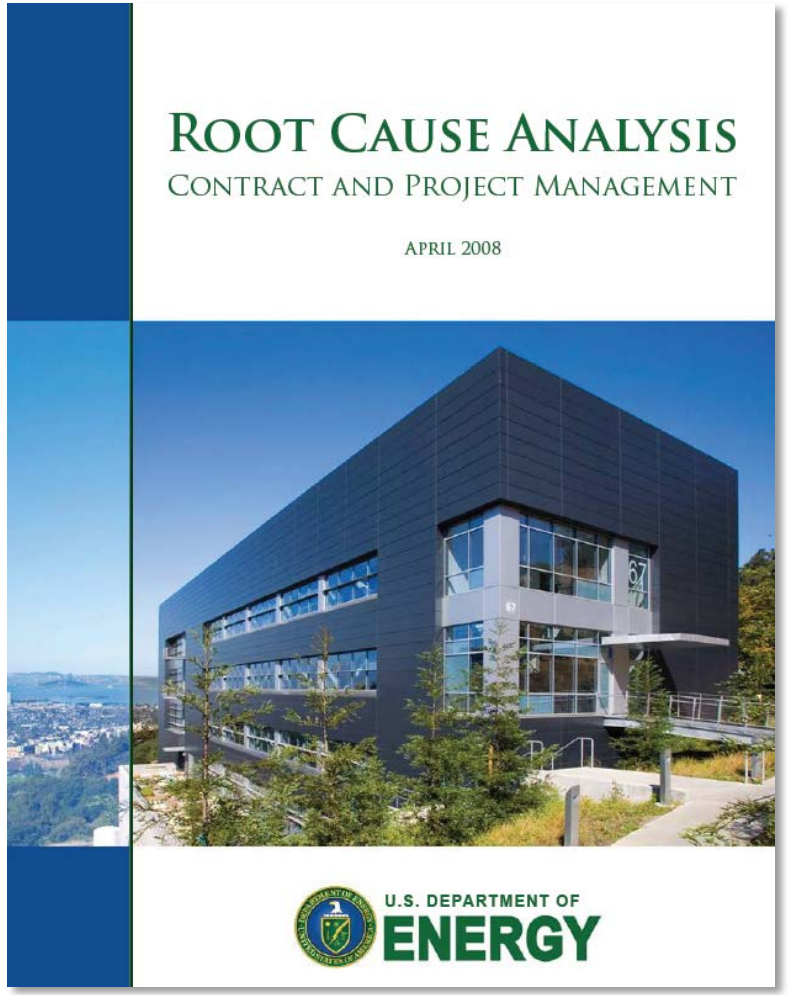
…defined as the process of developing sufficient strategic information with which owners [Government] can address risk and make decisions to commit resources in order to maximize the potential for a successful project.

root cause analysis

April 2008 Root Cause Analysis Contract and Project Management

Number one issue from 143 identified:

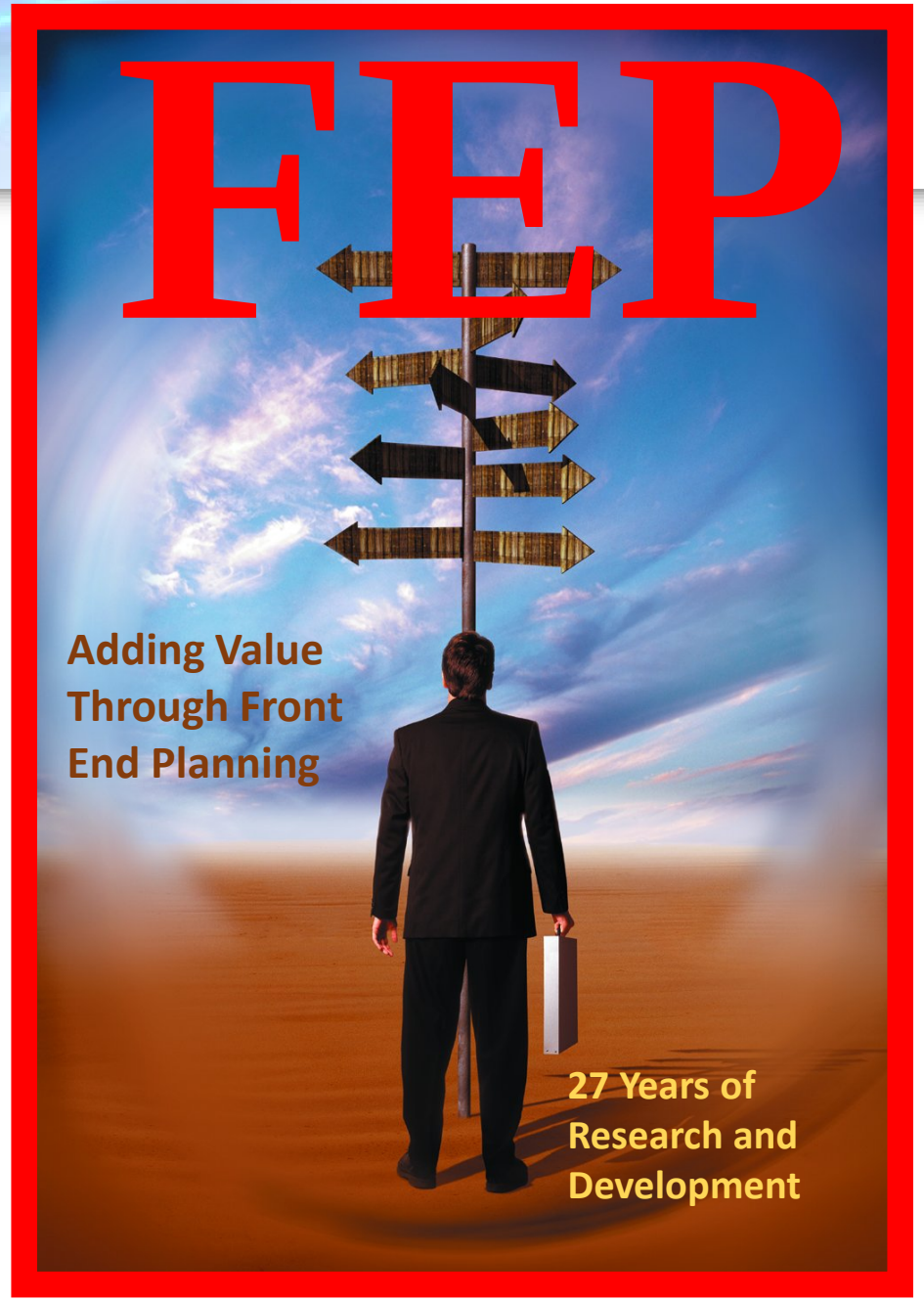
- "DOE often does not complete front-end planning (project requirements definition) to an appropriate level before establishing project baselines.
  - Insufficient number of personnel
  - Lack of personnel with the appropriate Skills
  - Inadequate time dedicated to front-end planning
  - Reliance on the management and operating (M&O) contractor
  - Lack of defined benchmarks
  - Lack of effective interdepartmental integration
  - Insufficient planning budget resources"



Planning is still not new…

The plans of the diligent lead to profit as surely as haste leads to poverty

--Proverbs 21:5

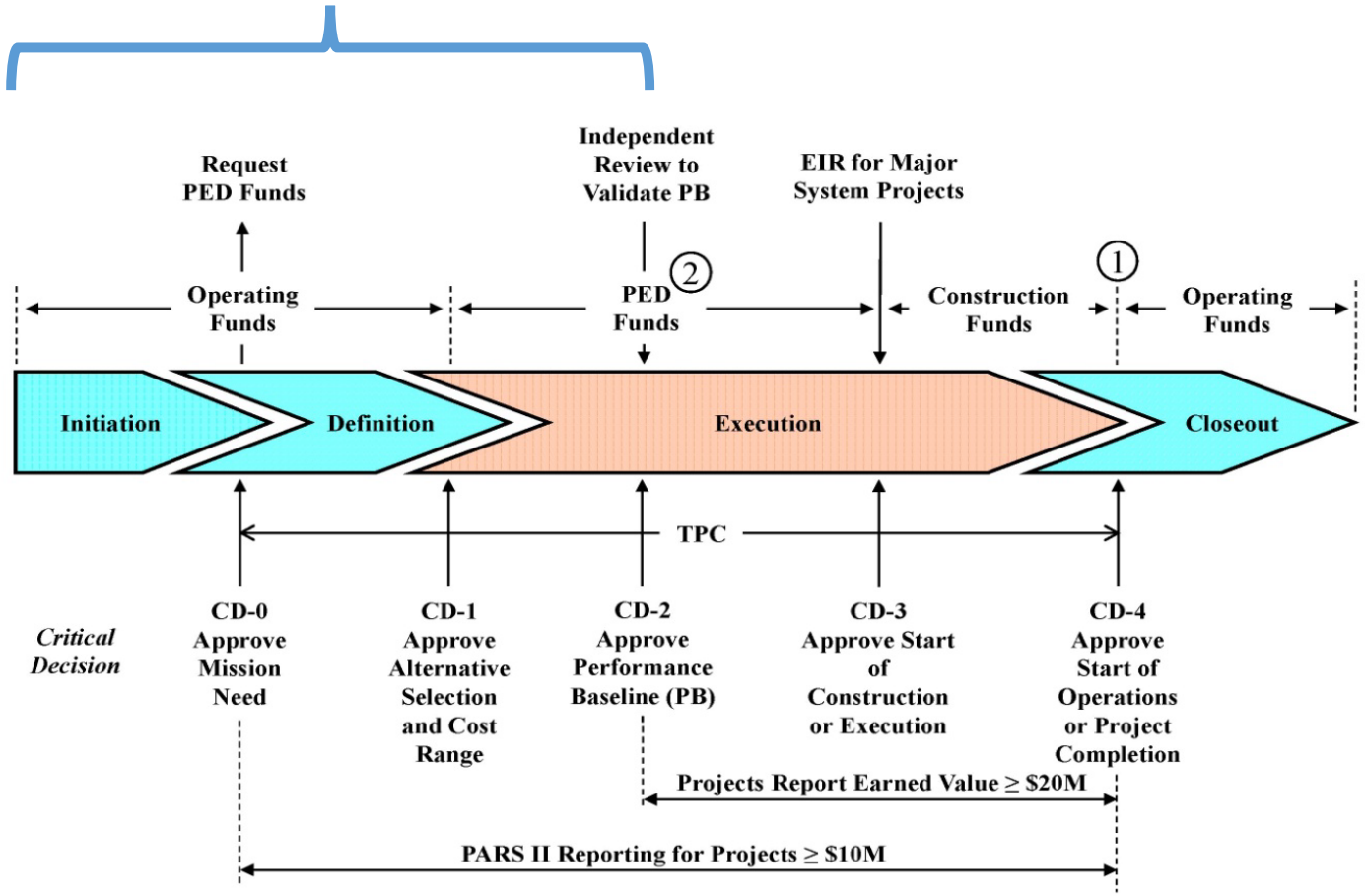


27

years of front end planning (FEP) research

DOE Order 413.3B process map

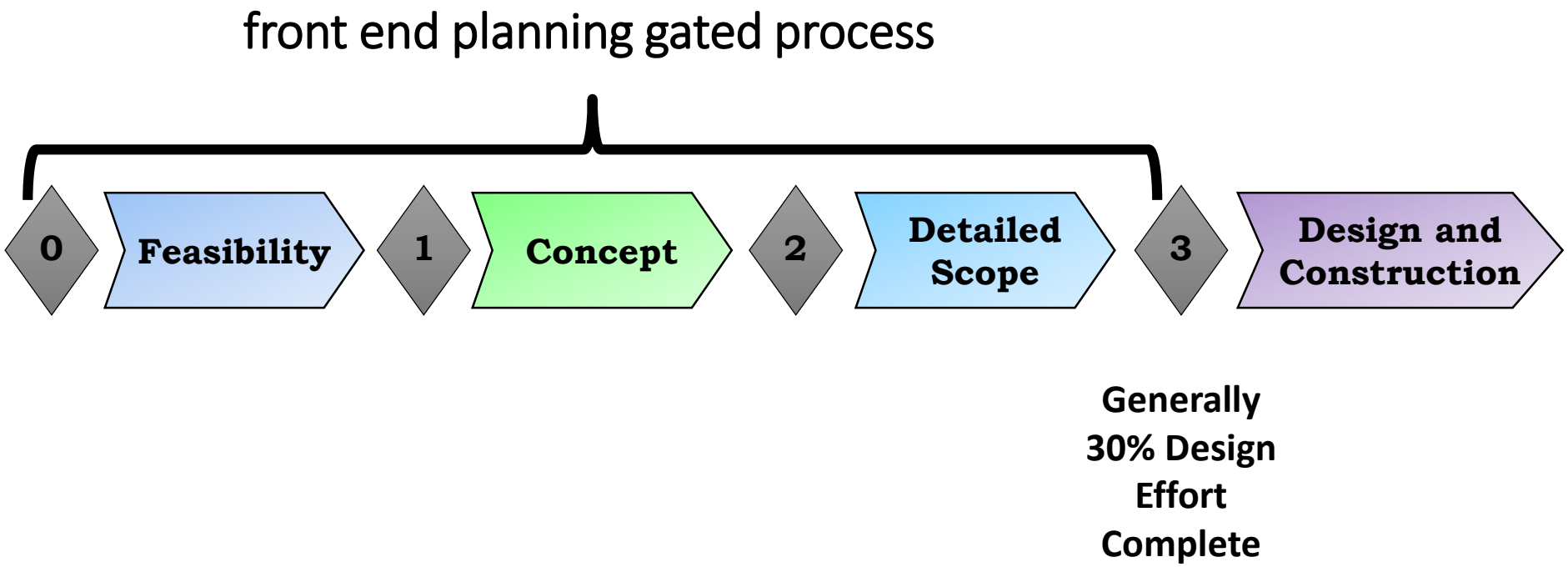
Front End Planning



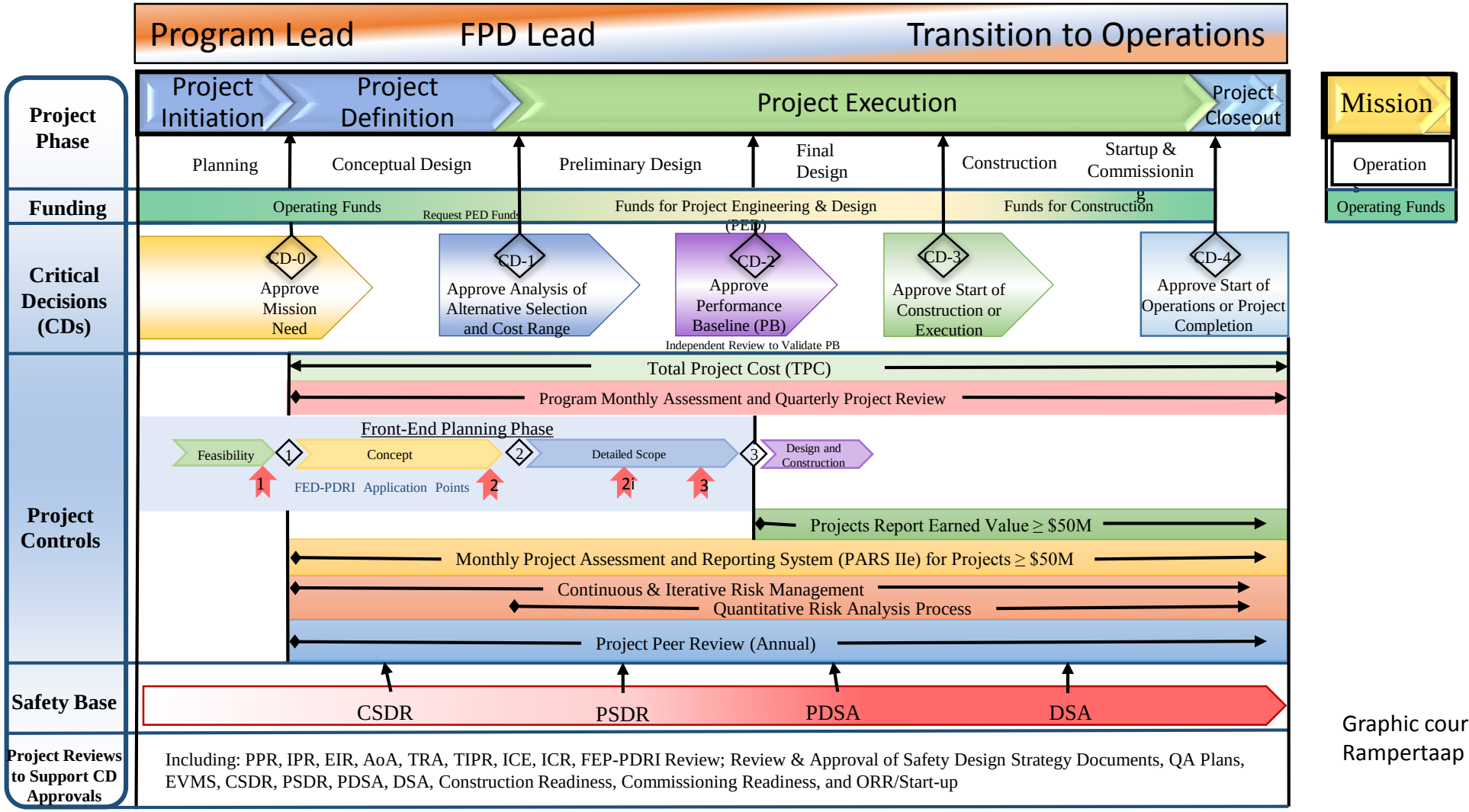
NOTES:
1. Operating Funds may be used prior to CD-4 for transition, startup, and training costs.
2. PED funds can be used after CD-3 for design.

Planning for a major baseline change needs good front end planning too!

Construction Industry Institute…

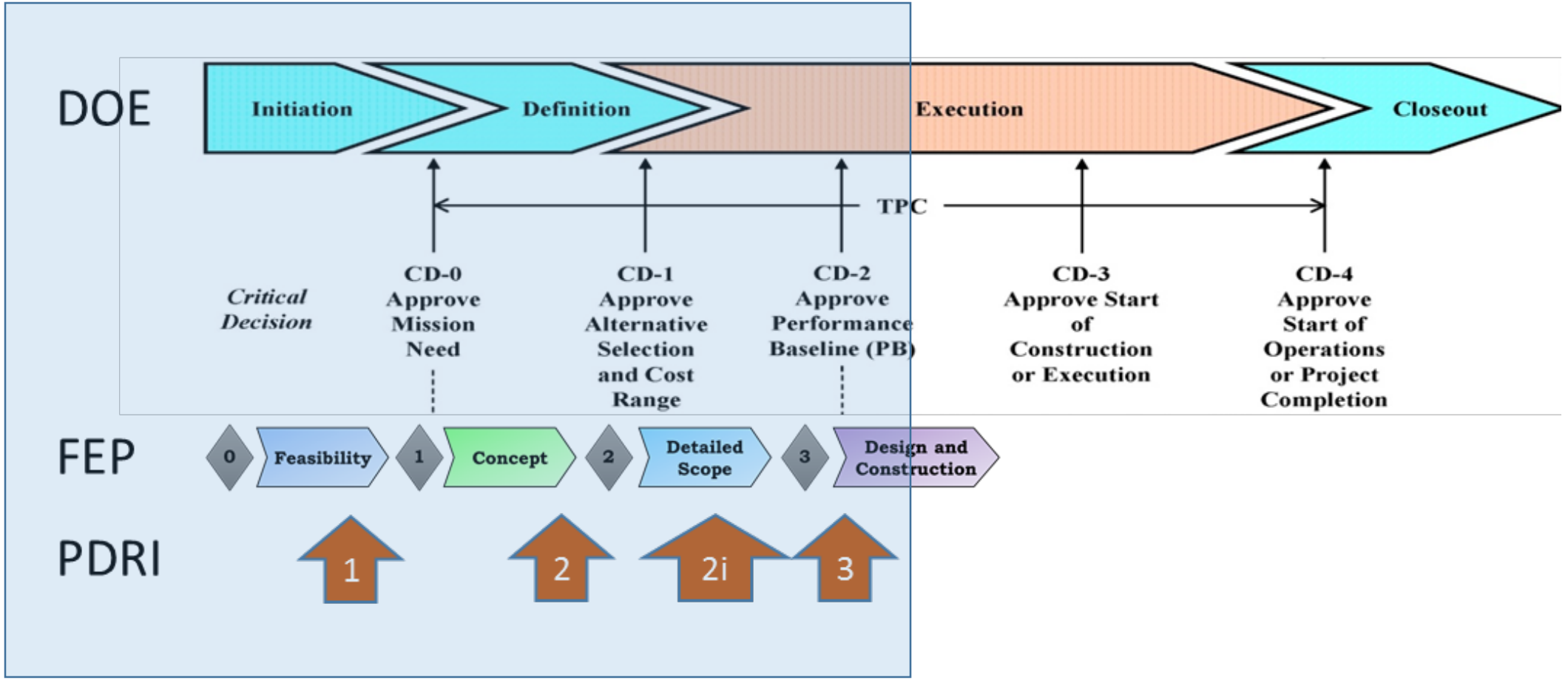


DOE Project Management Framework for DOE O 413.3B Capital Asset Projects



Graphic courtesy of Autar Rampertaap 02/2018, EM

Where PDRI tools benefit the most…

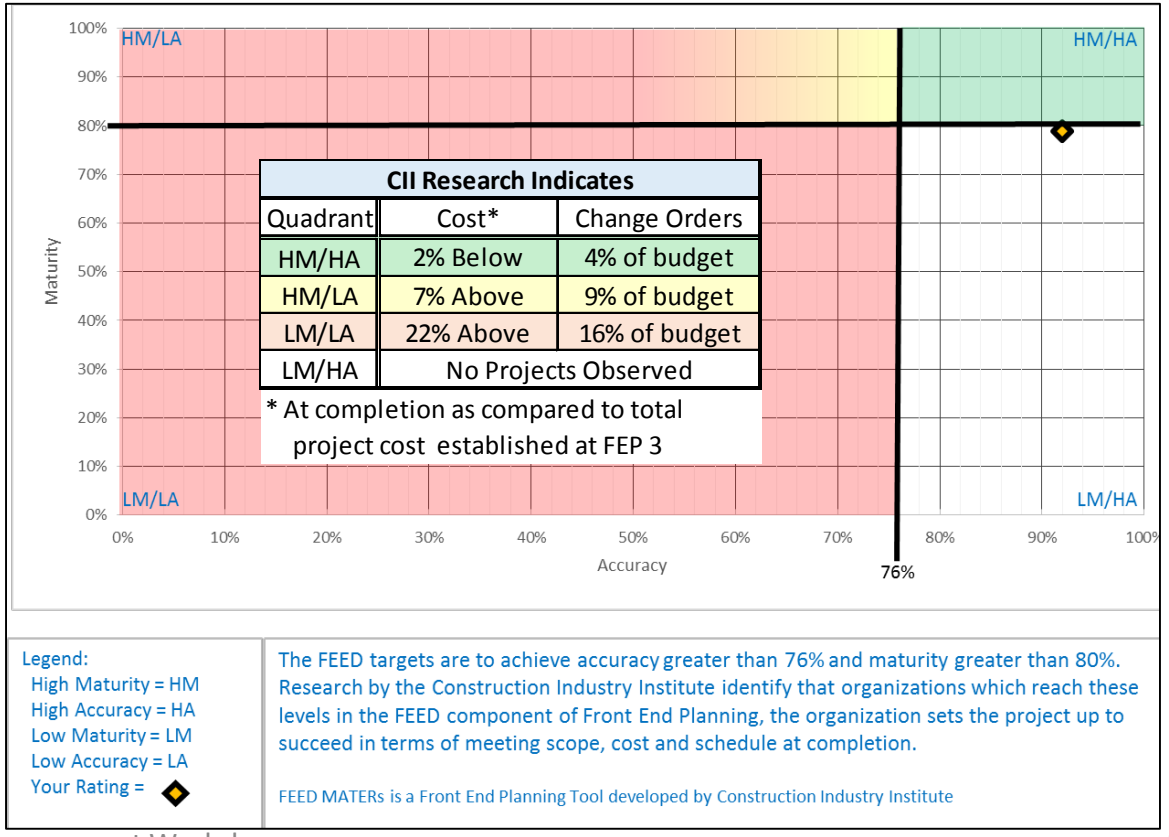


examples

FE - Strategic Petroleum Reserve – Life Extension Ph. 2

Replace and update surface infrastructure to extend facility life of SPR sites for 25 years. $1 billion total project cost estimate

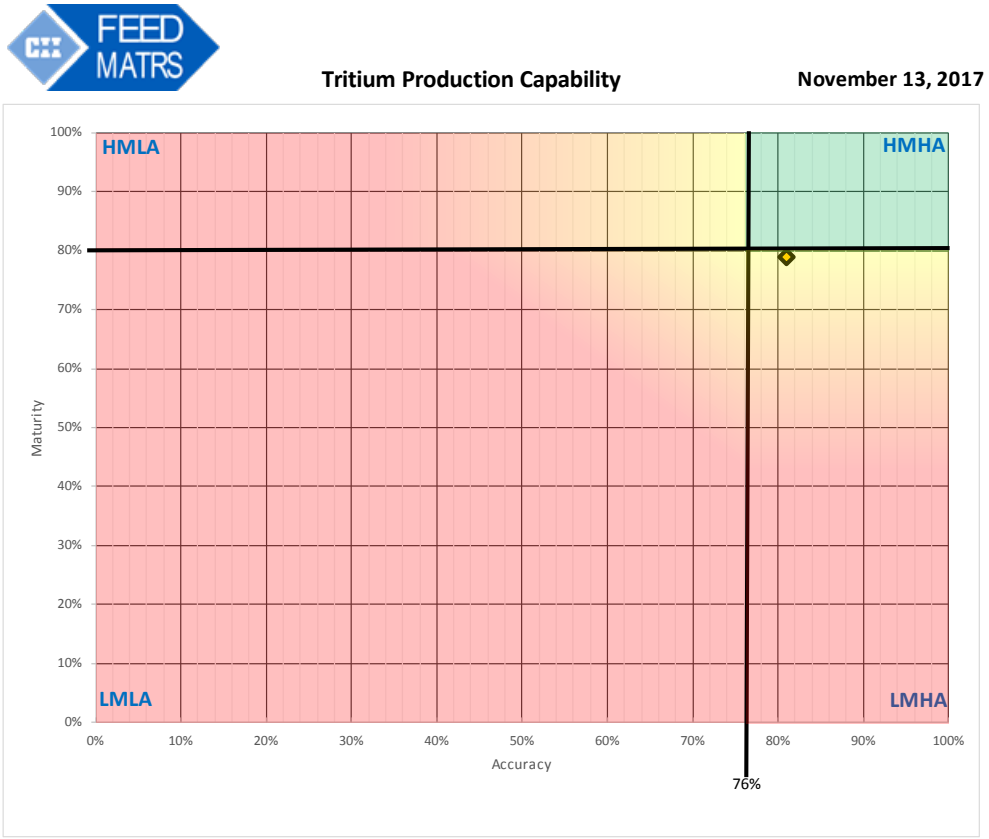
- front end planning process was performed jointly by the government and contractor as an IPT
- conducted before & after CD-1
- added second dimension
- accurate FEP
- mature scope definition
- challenge with change in strategic objectives
- gap list used to generate actions



NA – Tritium Production Capability

Establish new and update current facilities and process equipment to provide tritium to customers. total project cost estimate

- front end planning process was performed jointly by the government and contractors as an IPT
- conducted at CD-1
- added second dimension
- accurate FEP
- mature scope definition
- gap list to generate actions



NA – Tritium Production Capability cont.

FEED MATRS Summary (Percentage and Score)

FEED Elements Maturity Percentage ->	**79%**	
Full PDRI Score ->	**213**	
Score if Full PDRI and FEED Only % ->	**PDRI Score** (Lower is better)	**%** (Higher is better)
SECTION I - BASIS OF PROJECT DECISION	**53**	**89%**
A. MANUFACTURING OBJECTIVES CRITERIA	3	93%
B. BUSINESS OBJECTIVES	17	92%
C. BASIC DATA RESEARCH & DEVELOPMENT	4	96%
D. PROJECT SCOPE	25	79%
E. VALUE ENGINEERING*	4	85%
SECTION II – BASIS OF DESIGN	**132**	**67%**
F. SITE INFORMATION	21	80%
G. PROCESS / MECHANICAL	57	67%
H. EQUIPMENT SCOPE	19	42%
I. CIVIL / STRUCTURAL / ARCHETECTURAL	13	32%
J. INFRASTRUCTURE	6	76%
K. INSTRUMENT & ELECTRICAL	16	65%
SECTION III – EXECUTION APPROACH	**23**	**71%**
L. PROCUREMENT STRATEGY*	4	75%
M. DELIVERABLES*	0	100%
N. PROJECT CONTROLS*	6	65%
P. PROJECT EXECUTION PLAN	13	64%

* Not Applicable (N/A) when only looking at FEED Elements

Project Accuracy Percentage = (Higher is better)	**81%**
1. Project Leadership Team	**72%**
2. Project Execution Team	**93%**
3. Project Management Processes	**50%**
4. Project Resources	**81%**

Assessment Gaps (Maturity - Default Set to Definition Levels 3, 4, and 5; Accurary - Default Set to Definition Levels "Meets Some", "Needs Improvement", and "Not Acceptable"; Print on Legal Size Paper)

FILTER - Use this filter option to adjust to your needs

Generate Report

Generate Report resets Default Filters

For Project Team Use

Maturity

Element	Level	Comment	Minimum	Score	Maximum	Action	Action Owner	Due Date	Date Complete
D5. Lead/Discipline Scope of Work	3	WBS will be modified between CD-1 and CD-2/3.	1	7	13				
E2. Design & Material Alternatives Considered/Rejected	3	Open issues on constructability for various facilities (all but building 1).	0	4	7				
F2. Survey & Soil Tests	4	Will update during preliminary design.	1	10	13				
F4. Permit requirements	3	Stack and diesel and construction permitting will be required.	1	5	12				
G3. Piping & Instrumentation Drawings	4	Process flow documented at this point but not P&IDs.	2	23	31				
G6. Specifications	3	Equipment specs exist but not other specs.	1	8	17				
G10. Line List	4	Will be developed as part of preliminary design.	1	6	8				
G13. Instrument Index	3	Notional list developed.	1	4	8				
H1. Equipment Status	4	Will be addressed between CD-1 and CD-2/3.	1	12	16				
H2. Equipment Location Drawings	3	Equipment is shown on drawings but not analyzed for white space.	1	5	10				
I1. Civil / Structural requirements	4	To be worked in preliminary design.	1	9	12				
I2. Architectural requirements	3	To be deeloped during preliminary design.	1	4	7				
K2. Logic Diagrams	4	Will be developed prior to CD-2/3.	1	3	4				
K6. Instrument & Electrical Specifications	4	To be developed by CD-2/3.	1	5	6				
L1. Identify Long Lead/Critical Equipment and Materials	3	Procurement plan still in development.	1	4	8				
N1. Project Control Requirements	3	High level project controls defined.	0	4	8				
P5. Startup Requirements	3	Plan requires more definition.	0	2	4				
P6. Training Requirements	4	To be developed as the commissioning process is further defined.	0	0	0				

Higher Scores are worse and require more assessment and understanding of Risk and Uncertainty

Accuracy (1 - Project Leadership Team, 2 - Project Exectution Team, 3 - Project Management Processes, 4 - Project Resources)

Factor	Assessment	Comment	Minimum	Score	Maximum	Action	Action Owner	Due Date	Date Complete
1 d. Leadership team and organizational culture fosters trust, honesty, and shared values	Meets Some	Differing Opinons Impact Conceptual Design leading to Preliminiary Design. AS and Funding Challenges. NNSA IPL position. Congressional Committee agreement	0.0	2.0	5.0				
1 e. Project leadership team's attitude is able to adequately manage change	Needs Improvement	Tried to get ahead of curve with VE. I.E. Option 7 vs Option 9. Silence earlier delays decision to CD-1. More communication earlier would help ensure the project was ready for CD-1.	0.0	0.0	2.0				
1 f. Key personnel turnover, e.g., how long key personnel stay with the leadership team	Meets Some	Change in PME, BG Davis to Mr. Calbos	0.0	1.0	1.0				
3 f. Alignment of FEED process with available project information, including the existence of peer reviews and a standard procedure for updating FEED	Meets Some	Mostly in place, but a a couple items missing. PAOM, NA-APM-10 coordination. Needed more coordination between CD-0 and CD-1.	0.0	1.0	2.0				
3 g. Documentation of information used in preparing FEED	Needs Improvement	FEP team did not have a dedicated document management systems, but it going to move to M&O system. Documents marked, but not have approved DC. Documents still need review. Need a Federal LNO to work this.	0.0	0.0	1.0				
4 b. Calendar time allowed for preparing FEED Management tools available including technology/software	Meets Some	The AoA took a long time and delayed getting an CPDS for FY18 complete. This would have been improved with shorter timeline on AoA. VE study now or between CD-1 and CD-2.	0.0	2.0	5.0				

Higher Scores are better. Lower Scores require more assessment and Understanding of Risk and Uncertainty

NA – Tritium Production Capability cont.

Assessment Gaps (Maturity - Default Set to Definition Levels 3, 4, and 5; Accurary - Default Set to Definition Levels "Meets Some", "Needs Improvement",

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Maturity

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LMLA example project

Refinery upgrade. Baseline of $135 million, private owner, renovation.

- LMLA project; maturity score of 75 and accuracy score of 44
- 26% over baseline budget
- 20% behind schedule
- **Maturity issues**: client specs, fire protection studies, no pipe stress analysis, poor equipment procurement management, waste disposal, instrument and electrical design non-existent in planning and so forth
- **Accuracy issues**: key stakeholders not involved in FEP; lack of commitment of planning personnel; team turnover; leadership team's resistance to change during planning; poor leadership

Low Activity Waste Pretreatment System (LAWPS)

- LAWPS is front end system to pretreat waste prior to delivery to the LAW vitrification facility
- LAWPS IPR Feb 2015 for approval of CD-1:
  - STEP 1: Project Contractor, WRPS is asked to perform a self assessment prior to review
  - STEP 2: ORP asked to perform an assessment
  - STEP 3: IPR Team reviewed the WRPS self assessment and ORP assessment, then performed their own assessment

➢ **EM uses PDRI as a tool to identify project gaps or potential risks, more so than a numerical score**

Low Activity Waste Pretreatment System (LAWPS)

LAWPS PDRI Work-sheet for COST Section

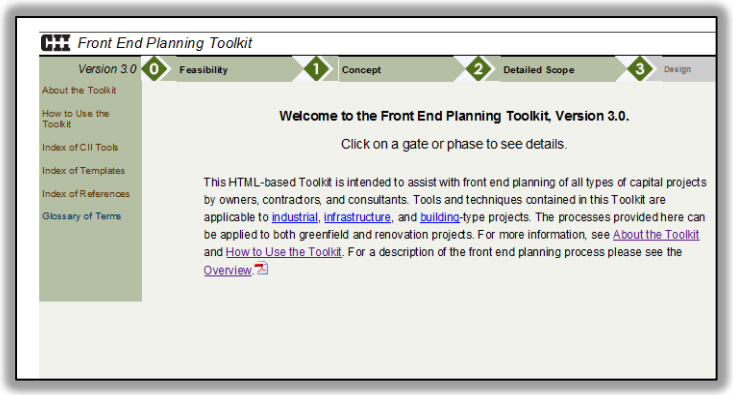
DOE G413.3-12 APPENDIX D PDRI Nuclear Construction CD-1 - ORP Low Activity Waste Pretreatment System Project IPR																	
Element		Designation	Weighting Factor	Target Score					Scored Values For CD-1 Project Phase								
				Conceptual Design (CD-1)		WRPS Self Assessment				ORP Self Assessment				IPR Team - Initial Assessment			
				Maturity Value	Score	Maturity Value	Score	WRPS Project POC	WRPS Comments	Maturity Value	Score	ORP Project POC	ORP Comments	Maturity Value	Score	Reviewer	Comments
A. COST																	
A1	Cost Estimate	H	7.5	2.0	15.0	2	15		Conceptual Design Cost Estimate is Class 4, level of project definition is estimated at 25% - see RPP-RPT-57121, Low Activity Waste Pretreatment System (T5L01) Conceptual Design Cost Estimate and Schedule	1	7.5		At CD-1 (conceptual design) a Class 3 cost Estimate is required. The contractor's level of project definition should qualify the estimate as Class 3, but their documentation states, "Class 4". PDRI suggested maturity value for a Class 4 estimate is 1, and ORP has selected this more conservative value.	2	15	Cost, Schedule & Risk Team	The cost estimate reflects that it is submitted as a an AACE class 4 estimate. The PDRI criteria for CD-1 requires a classs 3 estimtate. ORP continues to consider it a class 4. The IPR team evaluation concludes that it is a class 3 estimate.
A2	Cost Risk/Contingency Analysis	P	3.0	2.0	6.0	2	6		RPP-PLAN-57024, *Low Activity Waste Pretreatment System (Project T5L01): Risk*	2	6		RPP-PLAN-57024, *Low Activity*				

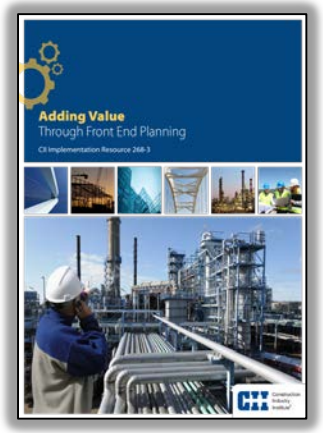
how to improve

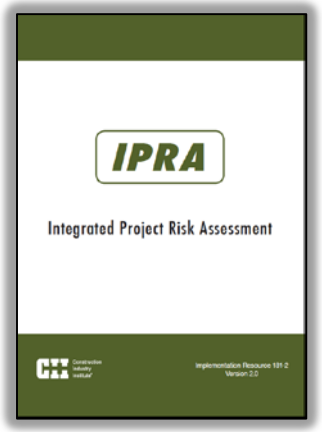
13

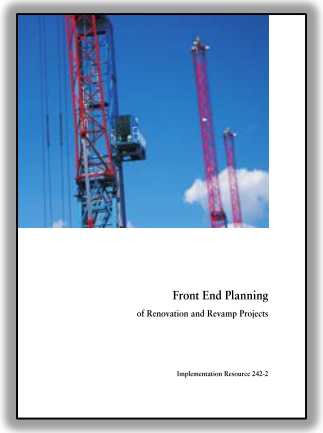
number of front end planning decision support tools at DOE

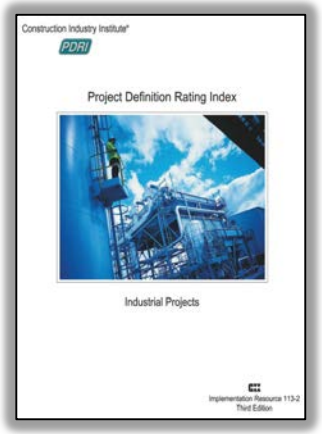
CII Suite of Best Practices Management Tools Available

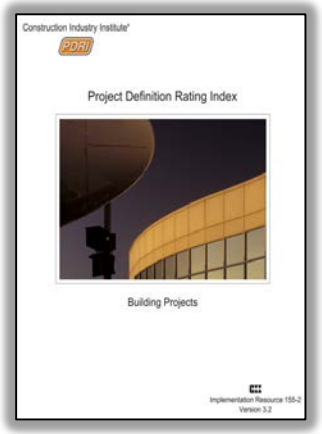


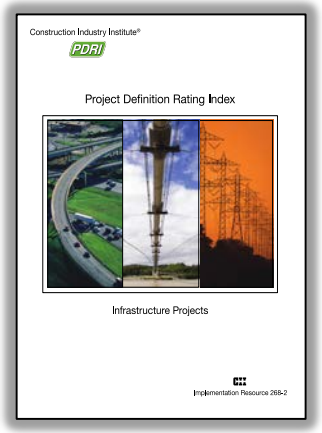


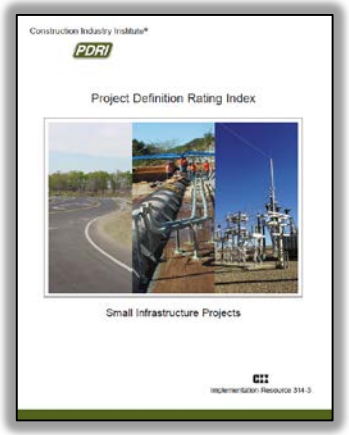


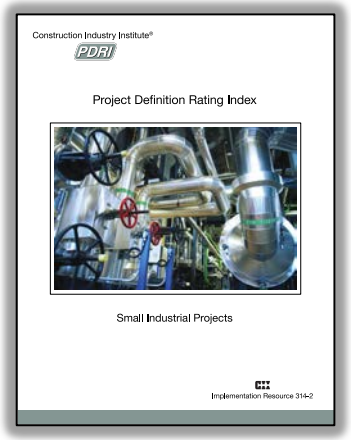






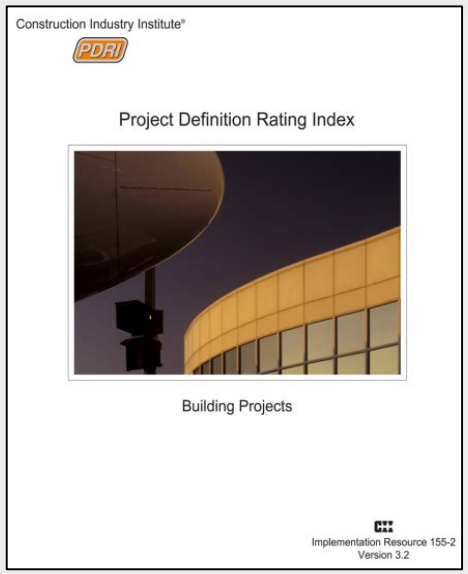




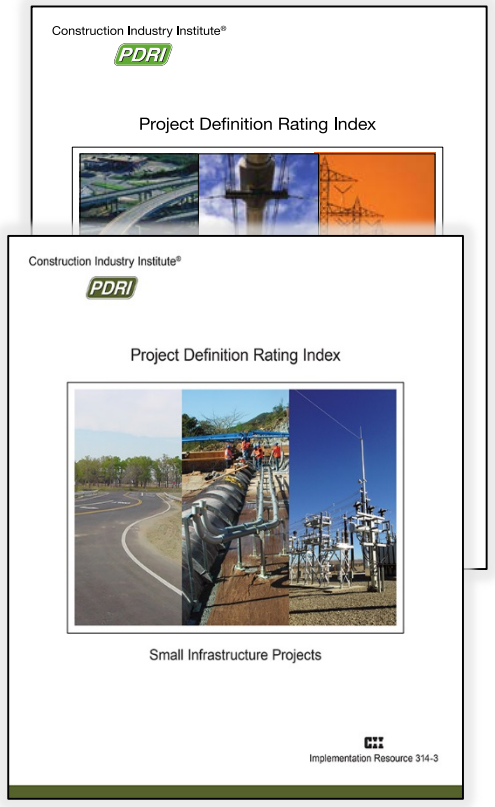


CII PDRI/FEED MATRS Suite of Tools

Building
1999

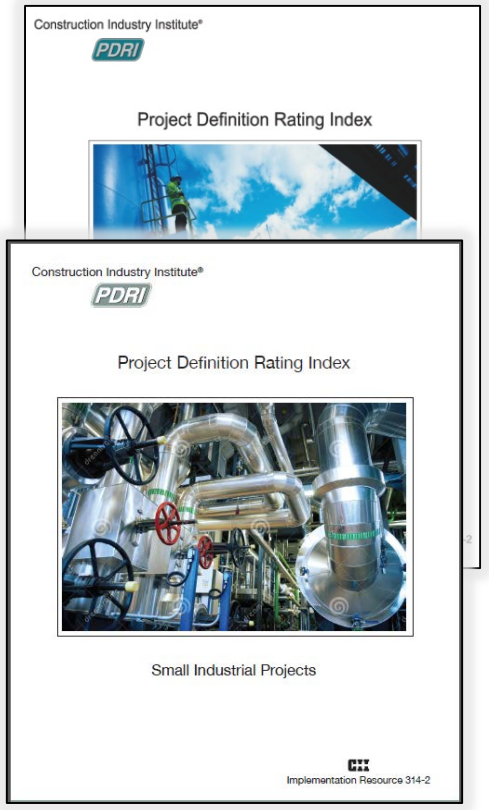


Infrastructure
2010



Small Infrastructure
2016

Industrial
1996



Small Industrial
2015

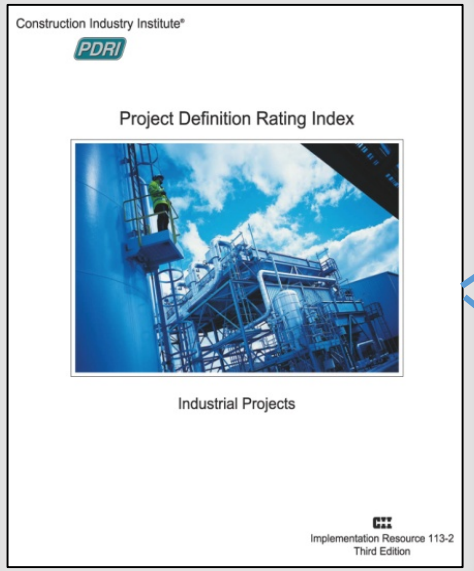
FEED MATRS
2017

>7,000

years of industry experience in the individuals involved in development of the CII PDRI/FEED MATRS tools

In-House PDRI/FEED MATRS Suite of Tools

CII Industrial 1996



EM General Construction

EM D&D

EM Environmental Restoration

Released 2000 – 2016 Update Effort Started

DOE/NNSA PDRI for Traditional Nuclear and Non-Nuclear Construction Projects

2009

Tool not being updated at this time

par·a·digm

"a typical example or pattern of something; a pattern or model”

–Oxford English Dictionary

“the set of practices that define a scientific discipline at any particular period of time”

–Thomas Kuhn

As mentioned last year…

in the 2010's

our projects are different; we don't have the time or resources to put into effective front end planning; we'll fix it on the fly

Result: Bad projects and broken careers are a norm

today?

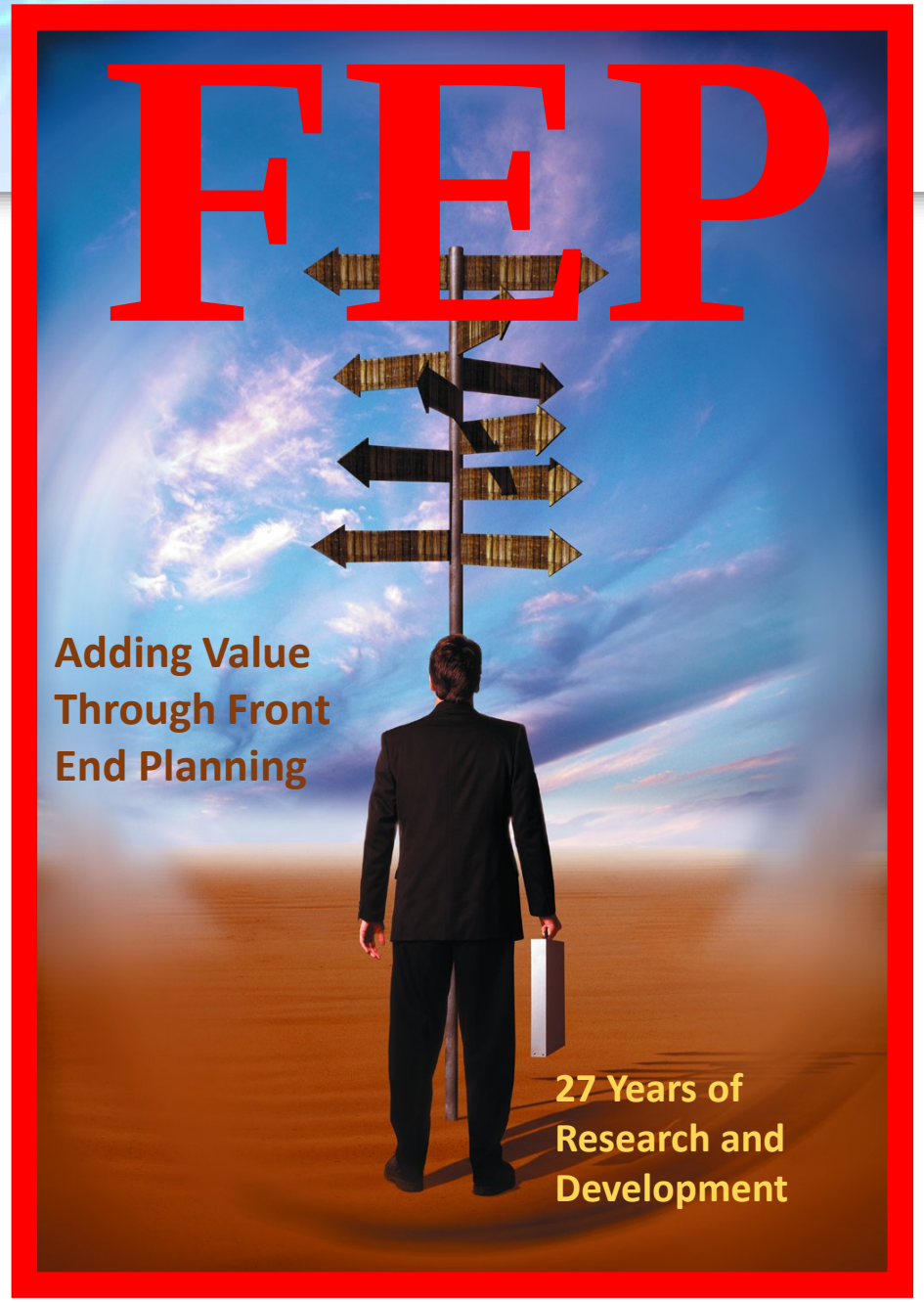
effective front end planning processes are still critical, but it is all about people and execution.

Result: government (owners), designers and contractors need to foster and invest in front end planning capabilities


Why?
What?
When?
How?

What we have done and what are we doing…

- Update Guide – IPT formed in 2017, IPT Charter in place and working to complete this summer – Focus on FEP and tools
- PMCDP – FEP / FEP tools pilot course conducted with course moving into development for deskside delivery
- Project Leadership Institute includes a course on the use of FEP Tools taught by Edd Gibson during Session 3.
- PDRI Certified Facilitators – DOE programs and PM working to increase certified facilitators to support PDRI use at DOE – Next classes for facilitators are in November 2018 at Arizona State University, Del E. Webb School of Construction – https://osha.asu.edu/https/osha.asu.edu/page-1860936/. Course also available for groups.



See you at the social this evening for questions!

27

years of front end planning (FEP) research