DEVELOPMENT AND UTILIZATION OF THE PROJECT DEFINITION RATING INDEX FOR SMALL INDUSTRIAL PROJECTS

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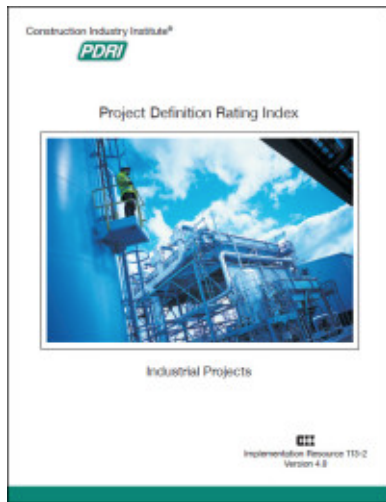
ICSC 2015
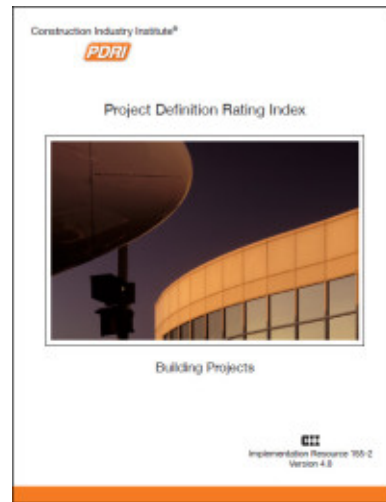*Vancouver, British Columbia*

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Presentation Outline

- CII Front End Planning Research

- PDRI-SIP Development

- What is a Small Industrial Project?

- PDRI-SIP Timing of Usage

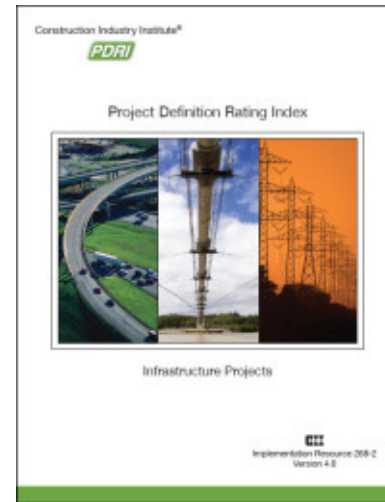- Utilization of the PDRI-SIP

- Conclusions

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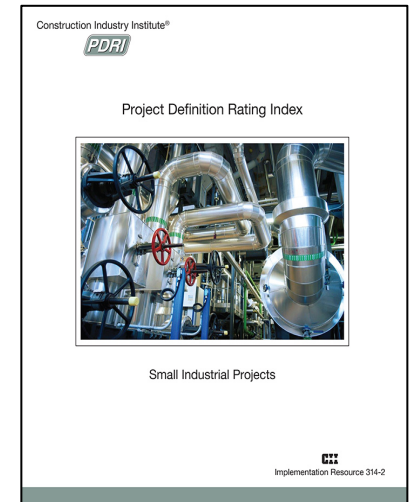# CII Front End Planning Research

1996

1999

2010

2015

Development of Element Descriptions

- PDRI-Industrial used as a baseline

- Three sub-teams, one per section

- Reviewed, scrutinized, deleted, added elements

- 41 Elements in final tool

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SECTION I. BASIS OF PROJECT DECISION

A.	**Project Alignment**	**B.**	**Project Performance Requirements**
A.1	Project Objectives Statement	B.1	Products
A.2	Project Strategy and Scope of Work	B.2	Capacities
A.3	Project Philosophies	B.3	Processes
A.4	Location	B.4	Technology
		B.5	Physical Site

SECTION II. BASIS OF DESIGN

C.	**Design Guidance**	**D.**	**Process/Product Design Basis**
C.1	Lead/Discipline Scope of Work	D.1	Process Safety Management (PSM)
C.2	Project Design Criteria	D.2	Process Flow Diagrams along with Heat and Material Balance
C.3	Project Site Assessment	D.3	Piping and Instrumentation Diagrams (P&ID's)
C.4	Specifications	D.4	Piping System Stress Analysis
C.5	Construction Input	D.5	Equipment Location Drawings
		D.6	Critical Process/Product Items Lists

E.	**Electrical and Instrumentation Systems**	**F.**	**General Facility Requirements**
E.1	Control Philosophy	F.1	Site Plan
E.2	Functional Descriptions and Control Narratives	F.2	Loading/Unloading/Storage Requirements
E.3	Electrical Single Line Diagrams	F.3	Transportation Requirements
E.4	Critical Electrical Items Lists	F.4	Additional Project Requirements

SECTION III. EXECUTION APPROACH

G.	**Execution Requirements**	**H.**	**Engineering/Construction Plan and Approach**
G.1	Procurement Plan	H.1	Engineering/Construction Methodology
G.2	Owner Approval Requirements	H.2	Project Cost Estimate
G.3	Distribution Matrix	H.3	Project Accounting and Cost Control
G.4	Risk Management Plan	H.4	Project Schedule and Schedule Control
G.5	Shutdown/Turnaround Requirements	H.5	Project Change Control
G.6	Precommissioning, Startup, & Turnover Sequence Requirements	H.6	Deliverables for Design and Construction
		H.7	Deliverables for Project Commissioning/Closeout

Sample Element Description

E.3   Electric Single Line Diagrams

Electric single line diagrams document the components, devices, or parts of an electrical power distribution system. These diagrams portray the system layout from the public utility's incoming supply to the internal electrical power distribution system. Depending on the size of the electrical system, the single line diagrams may include several levels of distribution. Items to consider should include:

- ☐ Incoming utility with owner substation/distribution to high and medium voltage motors and substations
- ☐ Electrical load list
- ☐ Unit substations and switch gear
- ☐ Motor control centers with distribution to motors, lighting panels
- ☐ Other user defined

** Additional items to consider for Renovation & Revamp projects**

- ☐ Field verify existing single line diagrams to ensure they are correct and have been maintained to reflect the actual site conditions.
- ☐ Verify locations and availability of power for new or relocated equipment.

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Development of Score Sheet

Location	Date	Number of Participants
Baton Rouge, Louisiana	4/10/14	19
Houston, Texas	5/9/14	12
Greenville, South Carolina	6/4/14	12
Indianapolis, Indiana	7/21/14	12
Houston, Texas	7/30/14	10

- 65 Workshop Participants
- 65 Weighted PDRI forms completed
- 1,299 Collective years of experience
- 20 years (on average) estimating/project management experience
- 64% of experience (on average) related to small projects
- 85% of experience (on average) related to industrial construction projects
- 29 Organizations represented

PDRI-SIP Score Sheet

SECTION I - BASIS OF PROJECT DECISION							
CATEGORY Element	Definition Level						Score
	0	1	2	3	4	5	
A. PROJECT ALIGNMENT (Maximum Score = 153)							
A.1 Project Objectives Statement	0	2	13	24	35	47	
A.2 Project Strategy and Scope of Work	0	3	13	24	34	45	
A.3 Project Philosophies	0	2	8	14	19	25	
A.4 Location	0	2	11	19	28	36	
CATEGORY A TOTAL							
B. PROJECT PERFORMANCE REQUIREMENTS (Maximum Score = 135)							
B.1 Products	0	1	8	15	21	28	
B.2 Capacities	0	2	9	17	24	31	
B.3 Processes	0	2	7	12	17	23	
B.4 Technology	0	2	8	15	21	28	
B.5 Physical Site	0	2	8	14	19	25	
CATEGORY B TOTAL							
Section I Maximum Score = 288	SECTION I TOTAL						

Definition Levels
0 = Not Applicable   1 = Complete Definition   2 = Minor Deficiencies   3 = Some Deficiencies
   4 = Major Deficiencies   5 = Incomplete or Poor Definition

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Small vs. Large Industrial Projects

Project Complexity Indicator	PDRI- Small Industrial Projects	PDRI-Industrial Projects
Total Installed Cost	Less than $10 Million (US Dollars)	More than $10 Million (US Dollars)
Construction Duration	3 to 6 months	9 to 15 months
Level of Funding	Between regional and corporate	Between corporate and Board of Directors
Project Visibility	Moderate	Significant
Number of Core Team Members	7 to 9 individuals	10 and 15 individuals
Availability of Core Team Members	Part-time availability	Combination of part-time and full-time to completely full time
Extent of Permitting	None to minimal permitting	Minimal to significant permitting
Types of Permits	None to local/state permits	Locals/state to national permits
Number of Trade Contractors	3-4 separate trade contractors	7-8 separate trade contractors

PDRI Application Points

Potential PDRI Application Points
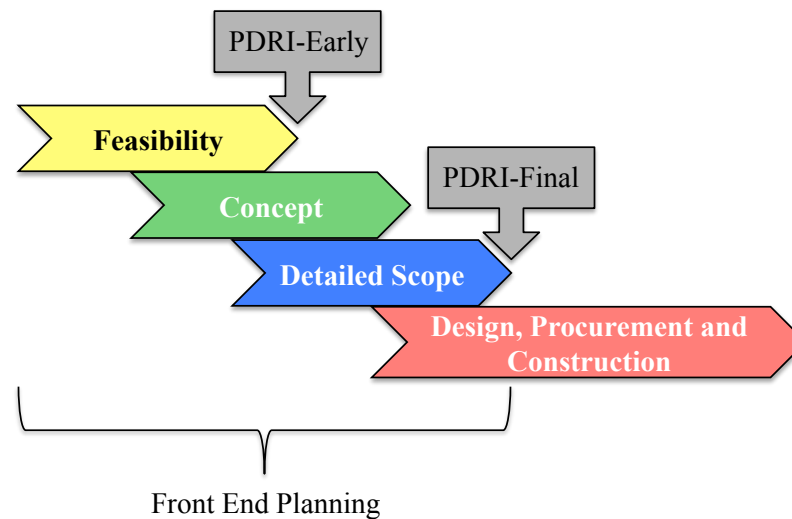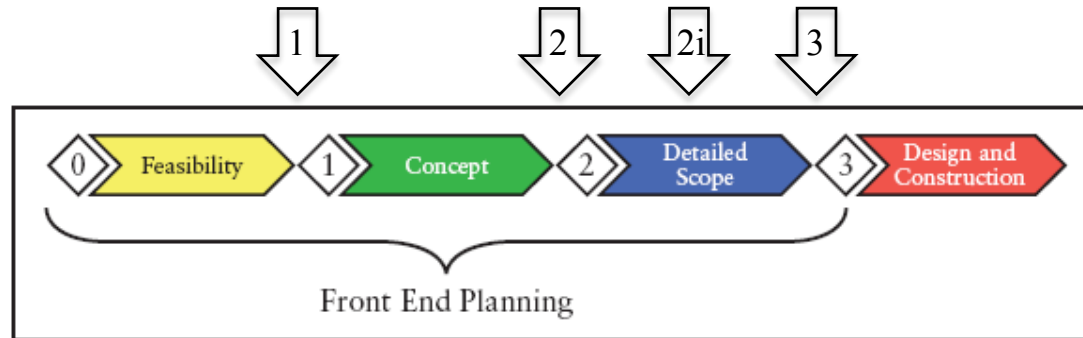
PDRI-SIP Utilization

Project Number	Project Facility Type	Process or Non-Process Related	Total Installed Cost (Estimated)	PDRI Score
1	Utility generation (i.e., steam, chilled water)	Process	$335,706	165
2	Pharmaceutical manufacturing	Process	$5,000,000	453
3	Chemical manufacturing	Process	$122,000	759
4	Pipeline pump station	Non-Process	$1,219,453	451
5	Natural gas processing	Process	$140,000	285
6	Manufacturing	Non-Process	$2,670,000	190
7	Manufacturing	Process	$14,730,000	184
8	Pharmaceutical manufacturing	Process	$4,500,000	196
9	Copper processing facility	Non-Process	$300,000	428
10	Pipeline meter station	Non-Process	$2,800,000	70
11	Pharmaceutical manufacturing	Process	$9,000,000	252
12	Manufacturing	Process	$5,000,000	168
13	Food processing	Process	$1,000,000	81
14	Food processing	Process	$3,570,132	116
Total Project Expenditure			**$50,387,291**	
Average Project Expenditure			**$3,599,092**	

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Conclusions

- Front end planning can substantially improve project performance

- PDRI-SIP developed specifically for small industrial projects

- Extensive testing has proven the efficacy of the tool

- See you in Boston!

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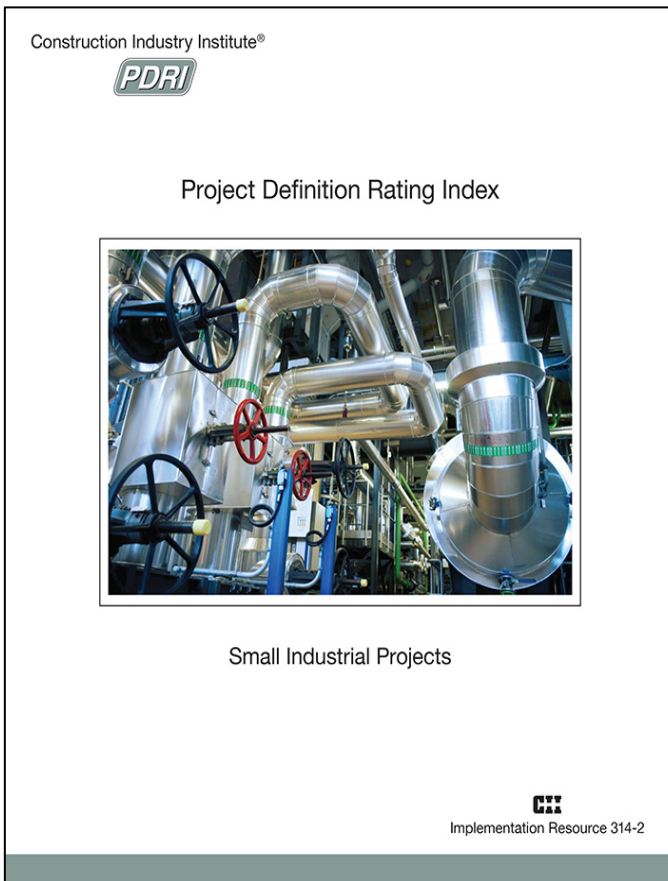
Thank You!
Questions?

Examples of Small Industrial Projects

Process

- Oil/Gas Refining Facilities
  - Stack monitoring and flare line replacement
  - Installation of gasoline cooler in pipeline
  - Addition of hydrogen plant within existing refinery
- Pulp/Paper Mills
  - Replacement of entangling section
  - Replacement of internal screens in digester vessel
- Manufacturing Facilities
  - Installation of a new packaging line
  - Addition of a motor control center

Non-Process

- Plant Upgrade/Retrofit
  - Replacement of existing elevators
  - Replacement of existing HVAC equipment
  - Replacement or upgrades to existing power supply
  - Water conservation projects
  - Addition of waste water clarifier to storm sewer system
  - Installation of new dust collection equipment and ducting
  - Installation of environmental monitoring or noise abatement equipment

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What is the PDRI?

- An acronym
  - **P**roject **D**efinition **R**ating **I**ndex

- A risk management tool
  - **Identify**—element descriptions and score sheet
  - **Measure**—scoring mechanism
  - **Mitigate**—action items

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