

# *Project Readiness: PDRI, FEED, and MATRS Tools*

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Northwest Construction Consumers Council  
Real World Solutions for Real World Problems  
September 26, 2019; Everett, WA





24%

COST DIFFERENCE BETWEEN

**High Maturity  
High Accuracy**

**Low Maturity  
Low Accuracy**

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Front End Engineering Design

# Background



Courtesy of [clipart-library.com](https://www.clipart-library.com)

# THE ENVIRONMENT



Photo: G. E. Gibson



# THE ENVIRONMENT

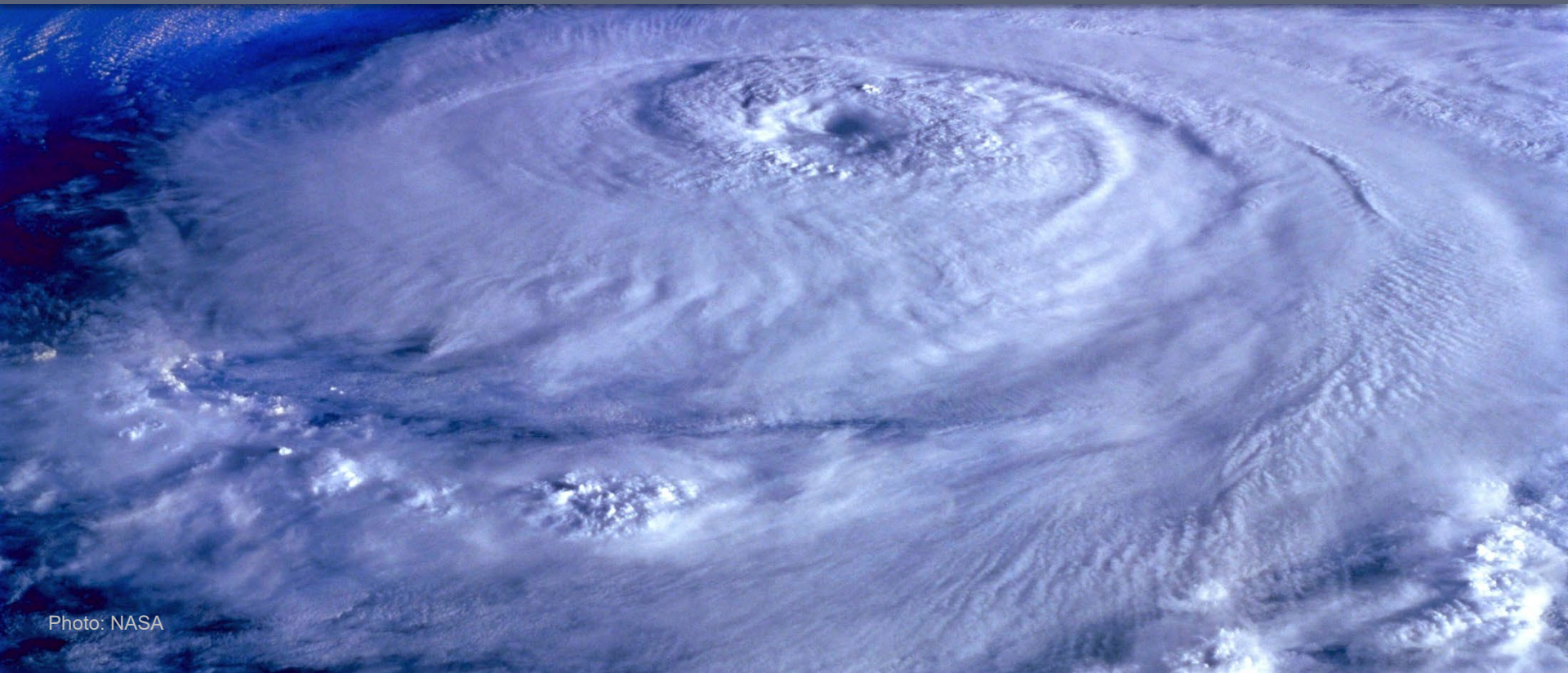


Photo: NASA

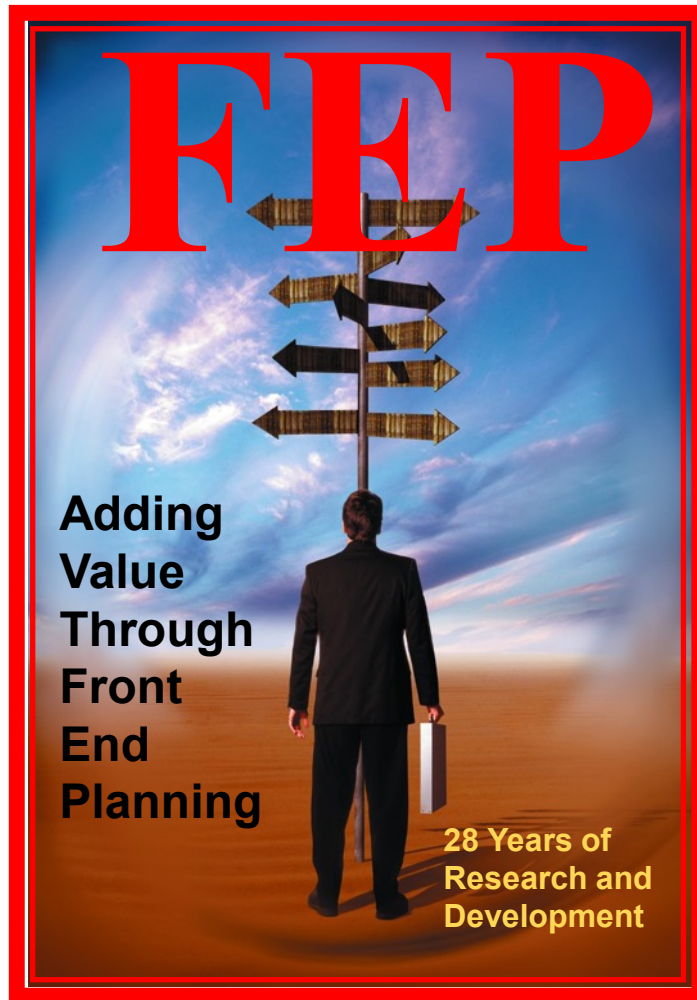
## **Choice** (*chóis*), noun:

**The range of different things from which you can choose;  
a person or thing that has been chosen or that can  
be chosen; a decision**

CAMBRIDGE DICTIONARY, 2019

# The Process

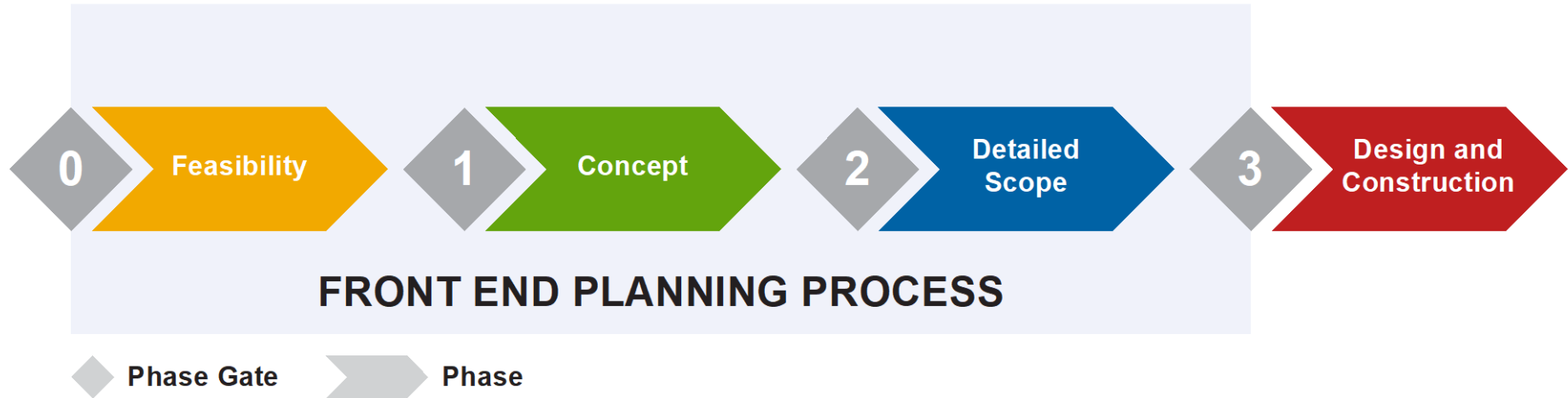




28

years of front end planning  
(FEP) research

# Front End Planning, PDRI & FEED



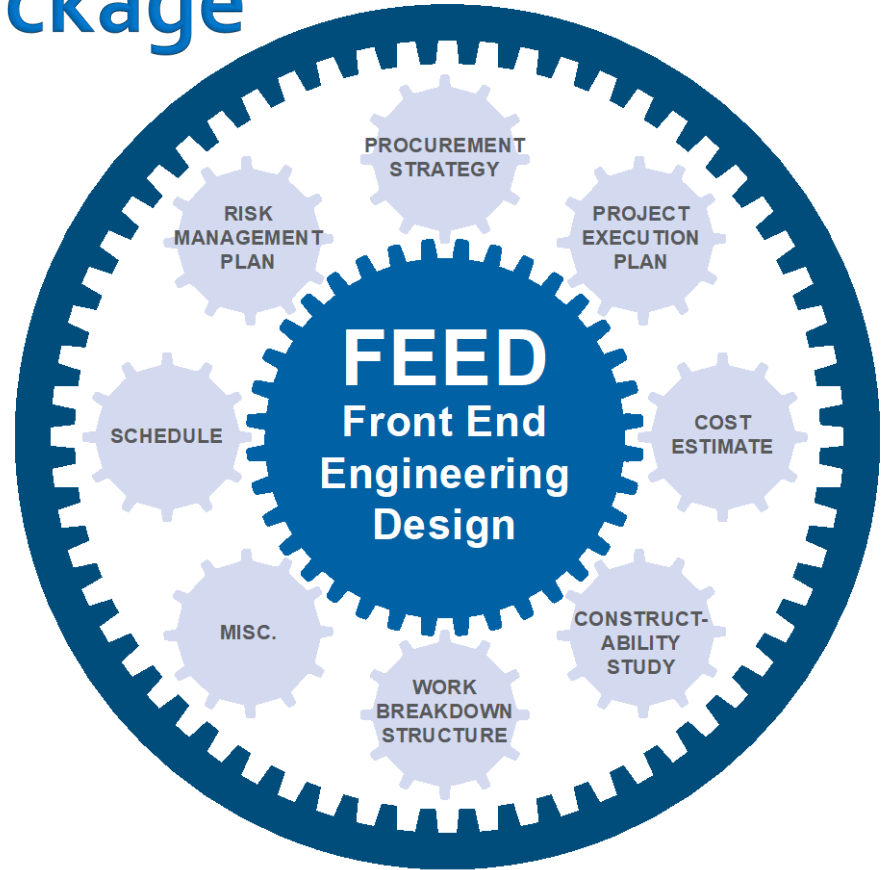
# FEED

A component of the Front End Planning (FEP) process performed during Detailed Scope (Phase 3), consisting of the engineering documents, outputs, and deliverables for the chosen scope of work.

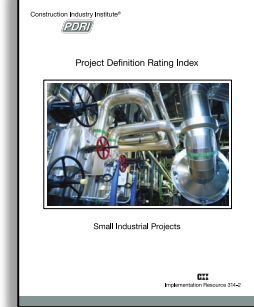
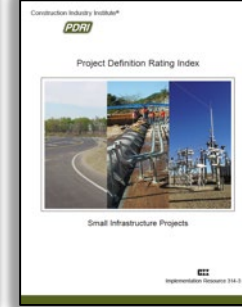
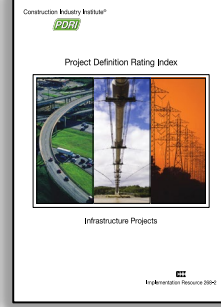
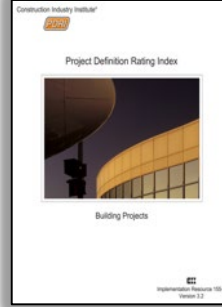
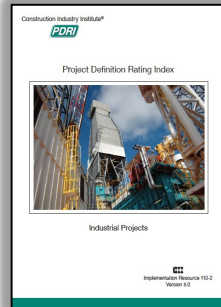
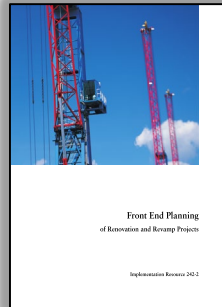
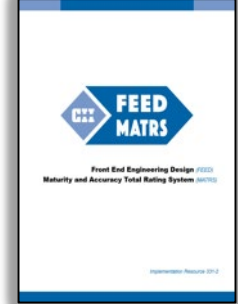
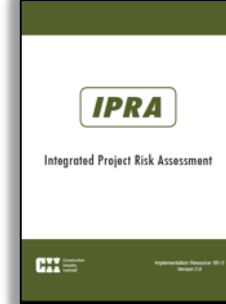
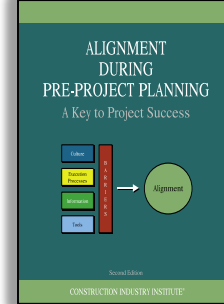
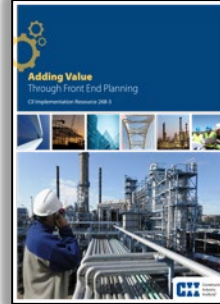
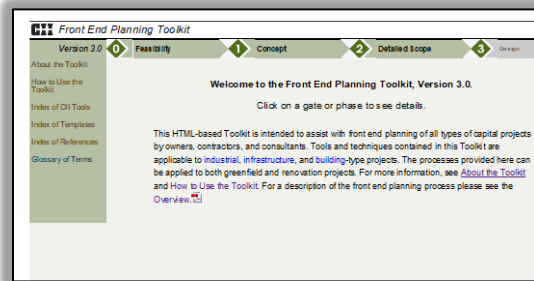


# Project Definition Package

- FEED
- Cost Estimate
- Schedule
- Project Execution Plan
- Procurement Strategy
- Risk Management Plan
- Constructability Study
- Other



# Suite of CII Best Practices Management Tools Available



# PDRI 5.0, PDRI MATRS



# RT 361, Development of the PDRI Maturity and Accuracy Total Rating System (MATRS)

**John C. Clarkin**, *Honeywell UOP*

**Namho Cho**, *Arizona State University*

**Mounir El Asmar**, *Arizona State University, Co-Chair*

**Eskil Carlsson**, *CSA Group*

**John R. Fish**, *Ford, Bacon & Davis, Inc. /*

*S&B Engineers & Constructors, Ltd.*

**Rob Garrison**, *Hargrove Engineering + Constructors*

**G. Edward Gibson, Jr.**, *Arizona State University, Chair*

**Eric Ochsner**, *Georgia Pacific, LLC*

**Anup Seshadri**, *Emerson Automation Solutions*

**Soundar R. Venkatakrishnan**, *Huntsman Corporation*

**James Vicknair**, *Eichleay Engineers*

**Matthew Z. West**, *U.S. Department of Energy*

## PAST MEMBERS

**Mark Balcezak**, *Chevron*

**Thomas Hefferan**, *Eli Lilly and Company*

**Hans Ryham**, *Occidental Oil & Gas*



## Project Definition Rating Index



Industrial Projects

Construction Industry Institute®  
**PDIR**  
Industrial Projects

Project Name: \_\_\_\_\_  
Client: \_\_\_\_\_  
Project Manager: \_\_\_\_\_

Project Status: ☐ Not Started ☐ Started ☐ In Progress ☐ Completed

Project Definition Rating Index Score Sheet and Session Report

Project Definition Rating Index Score Sheet and Session Report

## Project Definition Rating Index



Industrial Projects



## Front End Engineering Design (FEED) Maturity and Accuracy Total Rating System (MATRS)

Front End Engineering Design Maturity and Accuracy Total Rating System  
(MATRS) is a maturity and accuracy rating system for the Front End Engineering Design (FEED) phase of a project.

Project Name: \_\_\_\_\_  
Client: \_\_\_\_\_  
Project Manager: \_\_\_\_\_

Project Status: ☐ Not Started ☐ Started ☐ In Progress ☐ Completed

Project Definition Rating Index Score Sheet and Session Report

Project Definition Rating Index Score Sheet and Session Report

Construction Industry Institute®  
**PDIR**  
Industrial Project

Project Name: \_\_\_\_\_  
Client: \_\_\_\_\_  
Project Manager: \_\_\_\_\_

Project Status: ☐ Not Started ☐ Started ☐ In Progress ☐ Completed

Project Definition Rating Index Score Sheet and Session Report

Project Definition Rating Index Score Sheet and Session Report

46

**Front End  
Engineering  
Design (FEED)**  
elements that  
frame maturity

70

**PDRI Scope  
definition**  
elements that  
frame maturity

## SECTION I – BASIS OF PROJECT DECISION

## B. BUSINESS OBJECTIVES

#### B4. Affordability/Feasibility

Items that may improve the affordability of the project should be considered during scope development and communicated to the project team. These items may include incremental cost criteria such as:

- ☐ Consideration of feedstock availability and transport to the job site
- ☐ Understanding of raw material or feedstock and product variability in relation to cost and volume
- ☐ Reduction in manufacturing costs
- ☐ Performing an analysis of capital and operating cost versus sales and profitability
- ☐ Long-term environmental sustainability considerations
- ☐ Other

# Original

Comments on Issues:

*While this element references the project in the first sentence above, it is ultimately related to the affordability of the product over the facility's lifecycle. It also relates to the feasibility of delivering the product within specific cost, time, and other needs or constraints. Input on cost reduction options has been obtained from contractors and vendors (e.g., power supply, raw material availability and cost, equipment efficiency).*

## New

Definition Level					
N/A	BEST		MEDIUM		WORST
0	1	2	3	4	5
Not required for project.	<p>Items that may improve the affordability/ feasibility of the products have been completed and key stakeholders (e.g., the business unit) have approved the recommendations that will benefit the project.</p> <p>Efforts to assess and improve the affordability/feasibility of the products being produced by the facility have been accepted, incorporated into the design, and have been taken into consideration during the development of the phase 3 budget estimate. Specific items such as feedstock availability, feed/product prices and transport logistics have been thoroughly vetted, including contingency plans.</p>	<p>Most of the items that may improve the affordability/ feasibility of the products have been documented and are under review, but not fully approved.</p> <p>Efforts to assess and improve the affordability/ feasibility of the products being produced by the facility have minor issues that require resolution, such as, getting input from a few contractors and vendors who are involved in the analysis.</p>	<p>Some items that may improve the affordability/ feasibility of the products have been developed with open items.</p> <p>Efforts to assess and improve the affordability/ feasibility of the products being produced by the facility have several issues that require resolution, such as, getting input from key contractors and vendors who are involved in the analysis.</p>	<p>Some items that may improve the affordability/ feasibility of the products have been identified but not implemented.</p> <p>Initial thoughts have been applied to this effort; however, affordability/ feasibility items have not been applied to the project. Little or no meeting time or development hours have been expended on this element and nothing has been documented.</p>	Not yet started.
				New	

# 27

Factors that frame  
accuracy during  
**front end planning**

# Description of Accuracy Factor 4c

## 4. Project Resources

**4c. Local knowledge** (e.g., institutional memory, understanding of laws and regulations, understanding of site history) and **access** to visit and **evaluate** the site

The knowledge that the project team and subject matter experts have developed over time in a given area ensures that FEP is based on experience and adapted to the local culture and environment. For international projects, the project team should consider government influence, international codes and standards, taxes, foreign exchange rates, and applicable labor laws.

Additionally, access to the project site provides the project team with hands-on review and allows field verification of the site characteristics. This factor is extremely important for projects involving renovation and revamp construction activities.

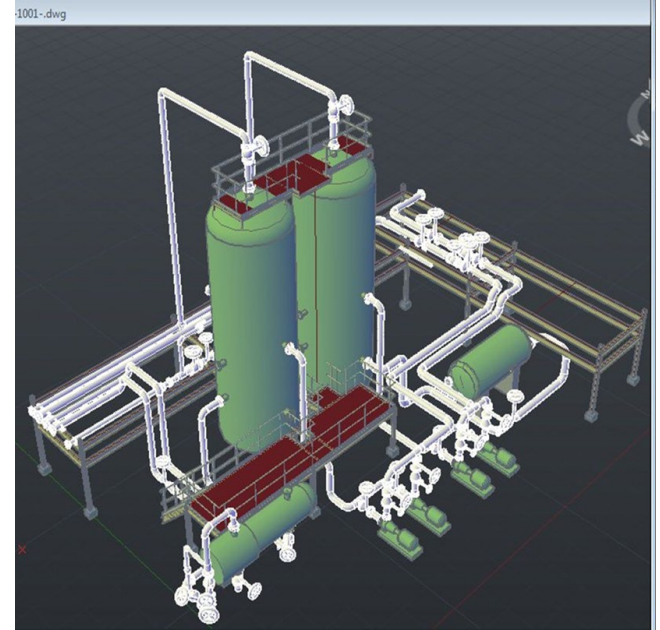
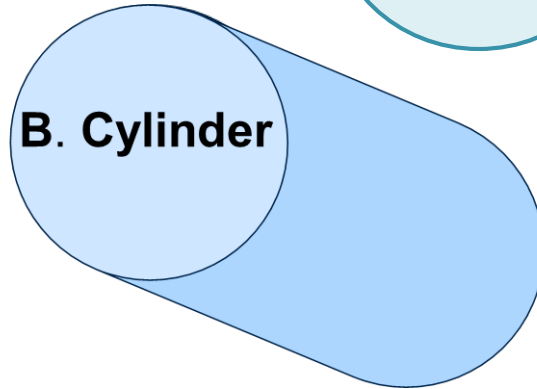
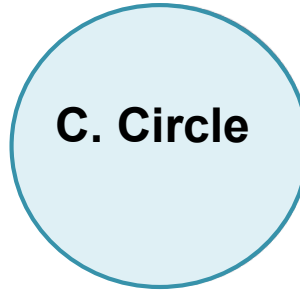
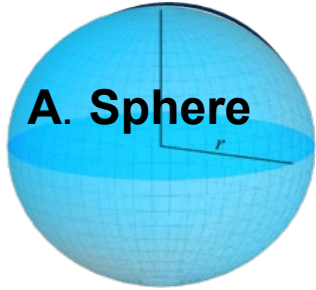


# Rating levels of the PDRI Accuracy Factors

N/A	High Performing	Meets Most	Meets Some	Needs Improvement	Not Acceptable
Not required for project.	Rating a factor <b>High Performing</b> indicates the factor's criteria are fully met within the context of their respective category, e.g., project leadership, execution, management, or project resources.	Rating a factor <b>Meets Most</b> indicates that the factor's criteria are consistently met and understood with minor deficiencies.	Rating a factor <b>Meets Some</b> indicates that the factor's criteria are partially met and without improvement, project success could be in jeopardy.	Rating a factor <b>Needs Improvement</b> indicates that the factor's criteria are not consistent in meeting project expectations and without improvement, the project is at risk. Substantial action to meet expectations is required.	Rating a factor <b>Not Acceptable</b> indicates that the factor's criteria are consistently below expectations and current performance is unacceptable. Project success cannot be achieved in this current state and actions are required to improve.

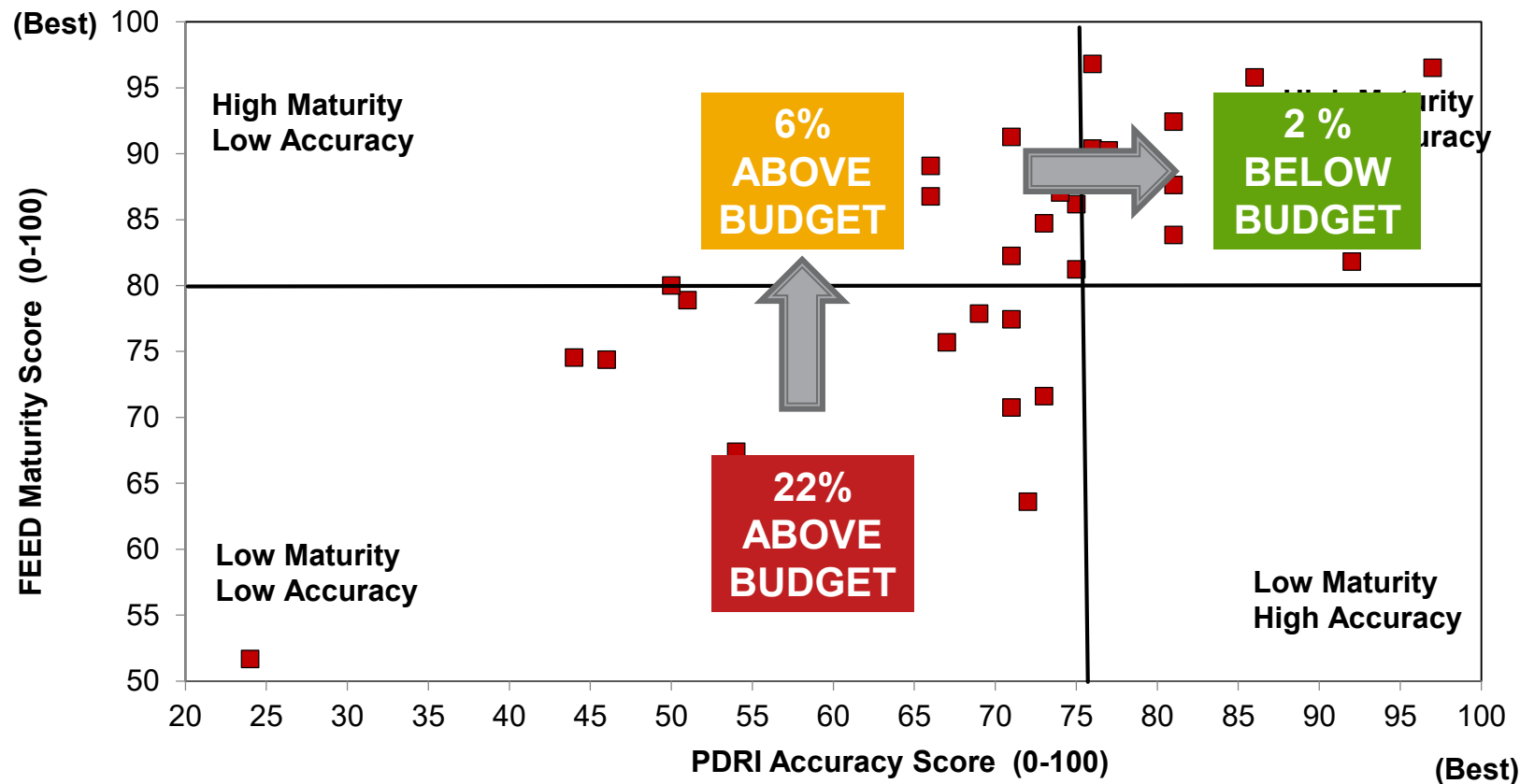
# Adding Dimension/Perspective

Clarity

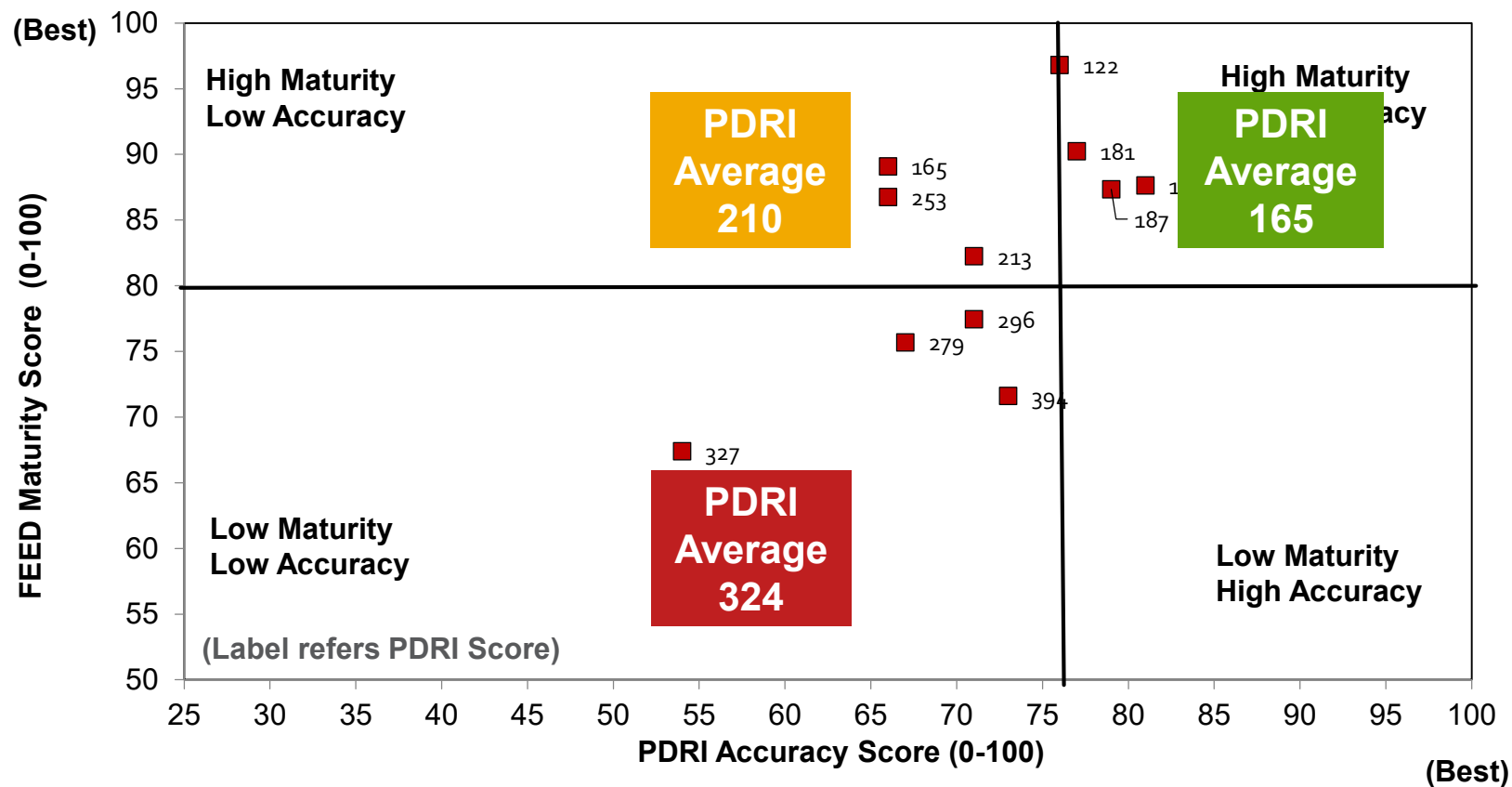


# Results

# Research Results



# Research Results



# The Tool



# PDRI MATRS - Excel™ Based Tool

- Similar to past Project Definition Rating Index (PDRI) Excel™ tools
- Both Excel™ -based and paper-based versions
  - Ready to use at any phase of FEP
  - Separate Maturity and Accuracy components

Construction Industry Institute®

Macro Security Settings

PDRI

Clear All Sheets

Industrial Project

This tool is optimized for Windows Operating System. Some displays on an Apple system do not look display as well. If using an Apple system - you can turn off the maturity element description hover over option, but it will cause the macro to fail if you try to turn it back on. The default is "Include Hover Over".

<b>Project</b>	<b>Project Type</b> (e.g., flar line replacement, packaging line, etc.)
Test 2	Business Expansion
<b>Owner/Client</b>	<b>Project Location</b>
Huntsman	Freeport, TX
<b>Project No.</b>	<b>Date</b>
HPP-2019-Freedom-001	Thursday, February 07, 2019
<b>Project Manager</b>	<b>Facilitator's Name</b>
Kristy Childers	Soundar R Venkatakrishnan
<b>Project Stage</b>	<b>Comments / Control Numbers</b>
PDRI 2: Concept	Facilitated in Hargrove Andleton, TX office

Is this a Renovation or Revamp Project?

☐ Yes
 ☐ No

PDRI MATRS Analysis Options

☒ Maturity Analysis
 ☐ All PDRI Elements
 ☐ Only Engineering Deliverables
 ☒ Accuracy Analysis

Maturity Element Descriptions

☐ Hide "Hover over" Descriptions
 ☒ Include "Hover over" Descriptions - DO NOT CHANGE when using Excel for Mac - Default

Select the Reports you would like to generate (Check all that apply):

☐ Summary of Gaps
 ☐ Element Logic Warnings
 ☐ PDRI Score Chart
 ☐ Graphical display of Results and summary
 ☐ PDRI Element Flow Logic

Zoom % selection for Maturity Facilitation Sheets (Type a value between 10-400)

70

Zoom % selection for Accuracy Facilitation Sheets (Type a value between 10-400)

70

Zoom % selection for Main Workbook pages (Type a value between 10-400)

100

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# 3

## METRICS

- PDRI score (0-1000)
    - FEED maturity (0-100)
- 
- PDRI accuracy (0-100)

# Use Cases

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**Accuracy**



early FEP 3

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**FEED maturity**



third party engineering deliverables

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**Full PDRI maturity**



the preparation of your organization and the engineering deliverables

# Lessons Learned

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- Choice to assess Maturity and Accuracy has made a difference
- Maturity is faster. Maturity + Accuracy can add 1-2 hours
- International teams, in particular, benefited from the revised definitions
- The additional scores will help you to pinpoint the areas that are causing you pain

200TH ANNIVERSARY EDITION

Signet Classics

CHARLES DICKENS

*A Tale of Two Cities*

Projects

“It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of light, it was the season of darkness, it was the spring of hope, it was the winter of despair.”

CHARLES DICKENS



# Project A



This project was also done in a rush to meet a compliance deadline that required us to separate our co-located facility into two separate plants (separate entrances, utilities, etc.)



We used a classic PDRI and a FEED MATRS accuracy review (Now both are in the PDRI MATRS Tool)



Evaluation showed weakness in our team composition and in our planning



# Project B



This was a rush to market project with a new product that had the potential to drive a tremendous amount of new business



Because it was so important that we get the project done right and done quickly we paid for a third party evaluation of our planning



Score came back showing we were well prepared

# Project Results

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Item	Project A	Project B
Front End Maturity	284 – PDRI	Contractor rated as excellent
Front End Accuracy	74%	Not Evaluated
Schedule Result	20% ahead	70% behind schedule
Cost Result	15% Under Budget	10% Over Budget
Overall Result	Happy Stakeholders	We don't speak of Project B

# Conclusion

## **Choice** (*chóis*), noun:

**The range of different things from which you can choose;  
a person or thing that has been chosen or that can  
be chosen; a decision**

CAMBRIDGE DICTIONARY, 2019

# Better maturity in front end planning

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Photos: [unsplash.com](https://unsplash.com); [pixabay.com](https://pixabay.com); [irunkidsmarathon.com](https://irunkidsmarathon.com)

# The team environment leading to more accuracy in front end planning

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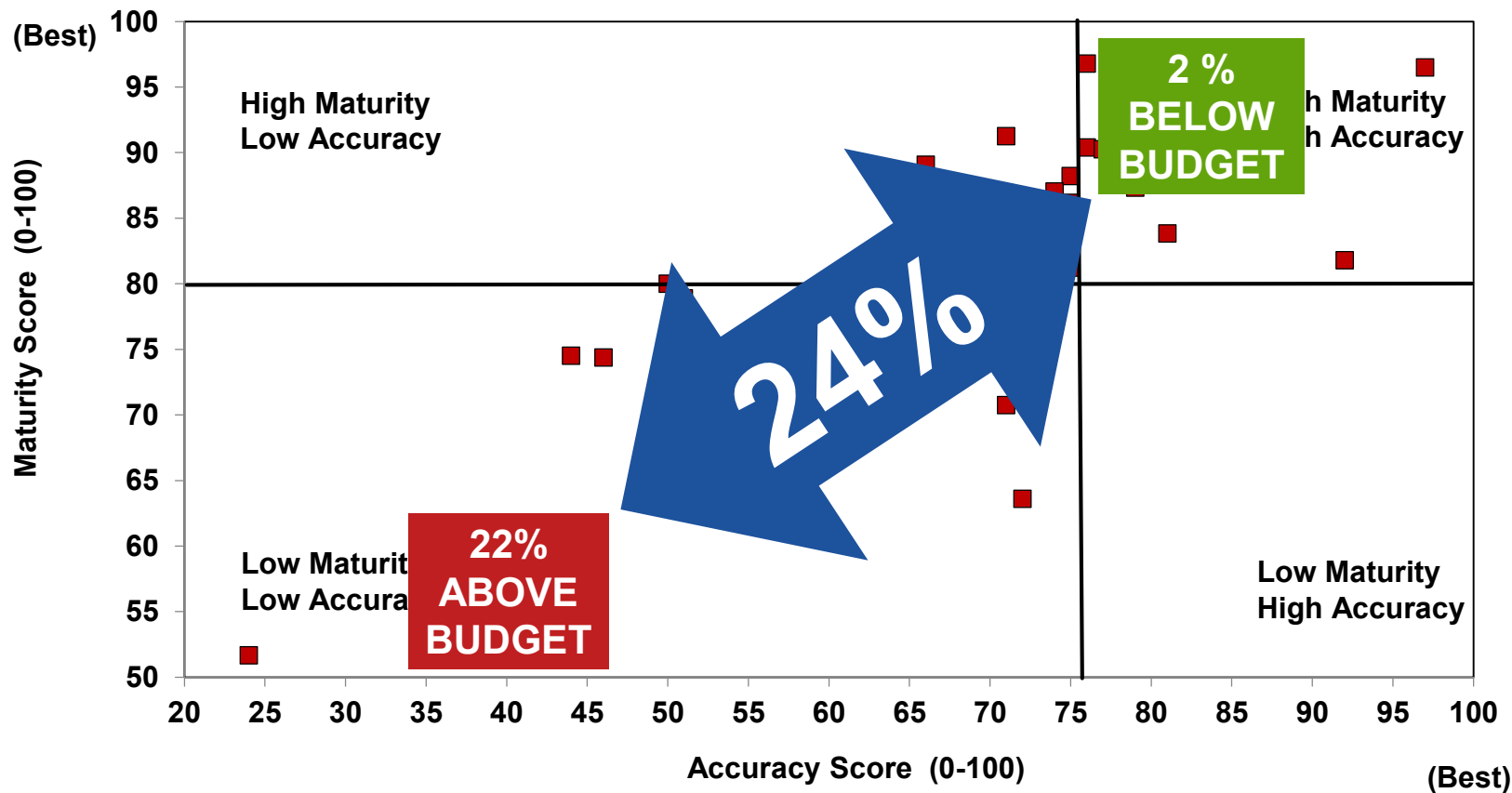
Photos: G.E. Gibson and NASA

**Consequence** (*kon si kwens*), noun:

**A result of a particular action or situation;  
the condition of having a lasting effect; importance.**

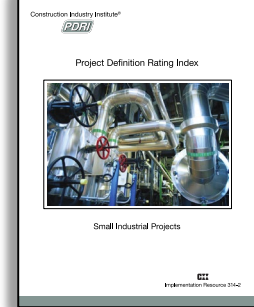
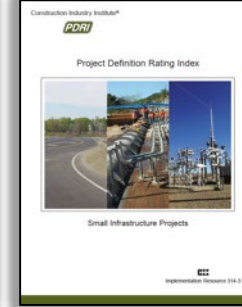
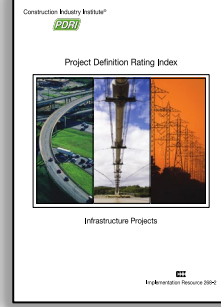
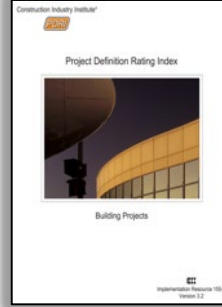
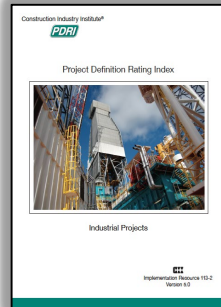
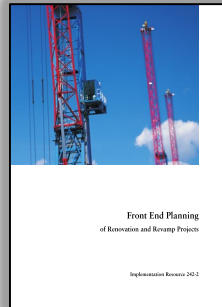
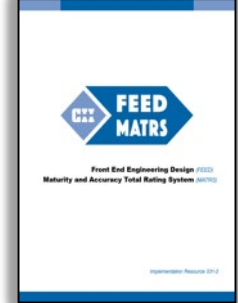
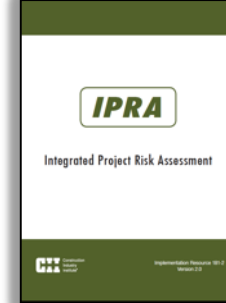
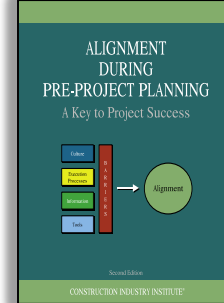
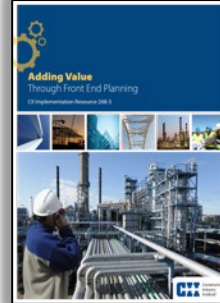
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# In Summary: Where do you want to be?





# The Choice is Yours.....



# WRAP-UP AND QUESTIONS

