



PROCESS
INDUSTRY
PRACTICES

MIMOSA Conference

December 5, 2018

Who is Michael Poehl ?

- **Michael Poehl**
 - PIP Director since April 2013
 - 28 years with BP / Amoco
 - Chemicals and Upstream
 - Technical / Operations Early Career
 - Vice President Amoco Energy Group North America
 - Retired in 2002
 - Adjunct Professor at University of Texas Chemical Engineering since 2002
- * Paw Paw (Best Job Ever)



Agenda

- **PIP Overview**
- **Metadata**
- **PIP Metadata FT**
- **Questions**



Agenda

- **PIP Overview**



PIP Vision

- **Owner, engineering, and construction companies** within the process industries seek active membership in PIP to establish Practices through the **direct exchange of knowledge** as a means to achieve superior results.



PIP Staff Recommendations

- Purpose:
- **Empower economic progress and capital efficiency by translating applied research into industry best practices.**

- Vision:
- **Global recognition for developing industry Practices through the direct exchange of knowledge by owner, engineering, and construction companies seeking to serve and advance society.**

- Mission:
- **Collaborate to produce a library of engineering Practices encompassing globally relevant guidance and technical criteria within a program that provides opportunity for professional education and leadership development.**

Why Companies use P I P

- Member Companies have the opportunity to adopt the Process Industry Practices
- Reduce Plant Operating and Installation Costs
- Standardize Non-Proprietary Processes





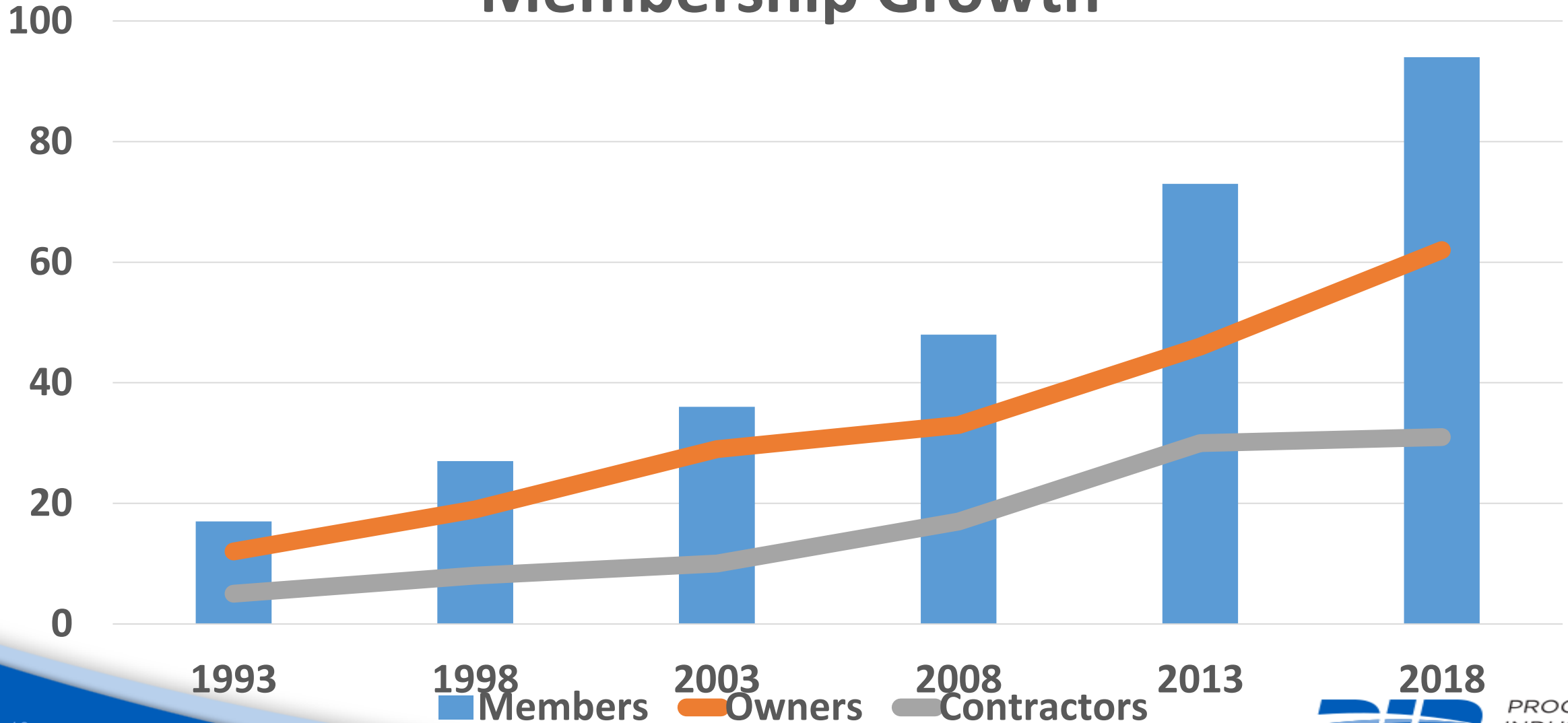
**BEST PRACTICE
BEST COST**

Active Members



Active Membership Growth

Membership Growth



PIP Volunteers

- **Approximately 650 Active Volunteers**
 - **Subject Matter Experts**
 - **Function Team Members (350+)**
 - **Discipline Contacts**
 - **Management**
 - **Steering Team Representatives (100+)**
 - **Team Sponsors**
 - **Committee Leaders**
 - **Young Professionals**
 - **Development Opportunities**



PIP Non-active Member Companies

BAE Systems

Bahrain Petroleum - BAPCO

Baker Hughes

BEI Engineers

Braskem SA

Brock Group

Bryant Refractory

Carboline Company

CF Industries

Chevron Phillips

City of Montreal

Emerson

Engineering for the Petroleum
& Process Industries (ENPPI)

Extraction Oil & Gas

GMB Group

H+M Industrial EPC

HDR

IMTT

Jotun Paints

KMCO

Koppers

Kraton Polymers

Lanier & Associates

Lloyd Engineering

Medallion Operating Company

North West Redwater Partnership

NOVA Chemicals

ONEOK

OXEA

Petroleum of Trinidad & Tobago

Phoenix Park Gas Processors

Praxair

Prime Controls

ROCKWOOL Technical Insulation

Scientific Design Company, Inc.

SGC Energia SGPS

Sherwin-Williams

Stepan Company

Sumitomo Chemical

The University of Texas at Austin -

Department of Utilities & Energy
Management

The Williams Companies

Valero

Velocys

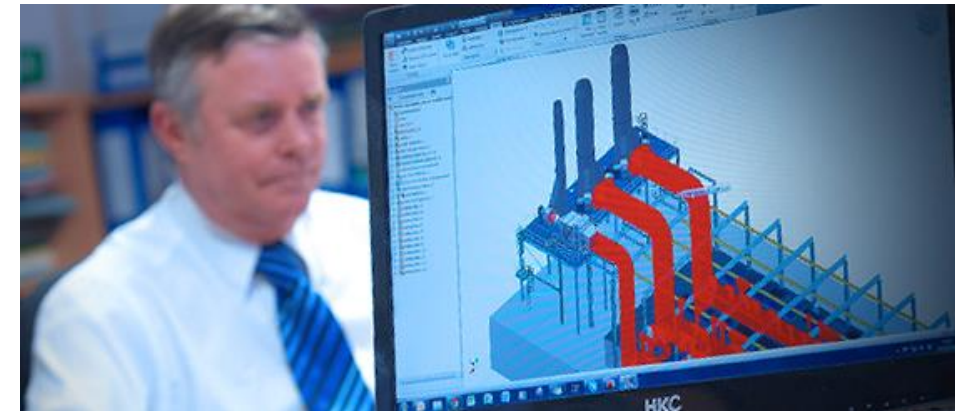
Wood Group USA, Inc.

PIP Licensees

API
ASME
Autodesk
Aveva
Bentley Systems
BlueBeam
BlueCielo ECM
Solutions
Cornell University
De La Salle University
Hexagon
IEEE
IHS

IRA-CIPEN
Kinsmen Group
Lamar University
Lee College
Montana State
University - Billings
National Institute of
Building Sciences
National Insulation
Association
Palomar College
South Central
Louisiana Technical
College (SCLTC)

St. Paul Technical
College
SAI Global
Techstreet (Clarivate)
University of North
Dakota
University of Wisconsin
– Madison

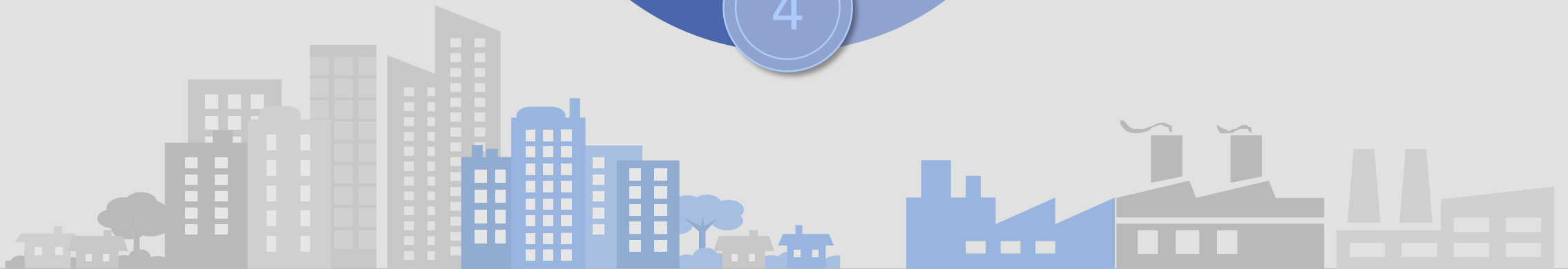


BENEFITS OF P I P



1

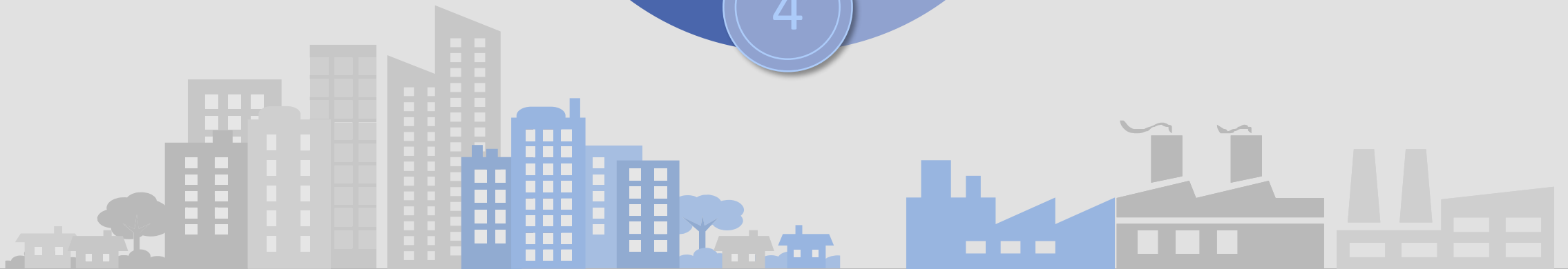
Up-To-Date
Full access to high quality up to date practices.



BENEFITS OF P I P



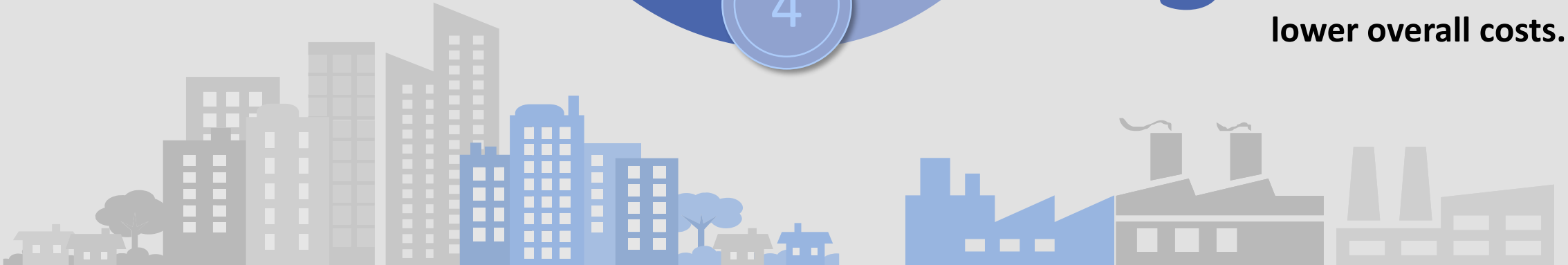
2 **Quality**
Improved delivery
of capital projects



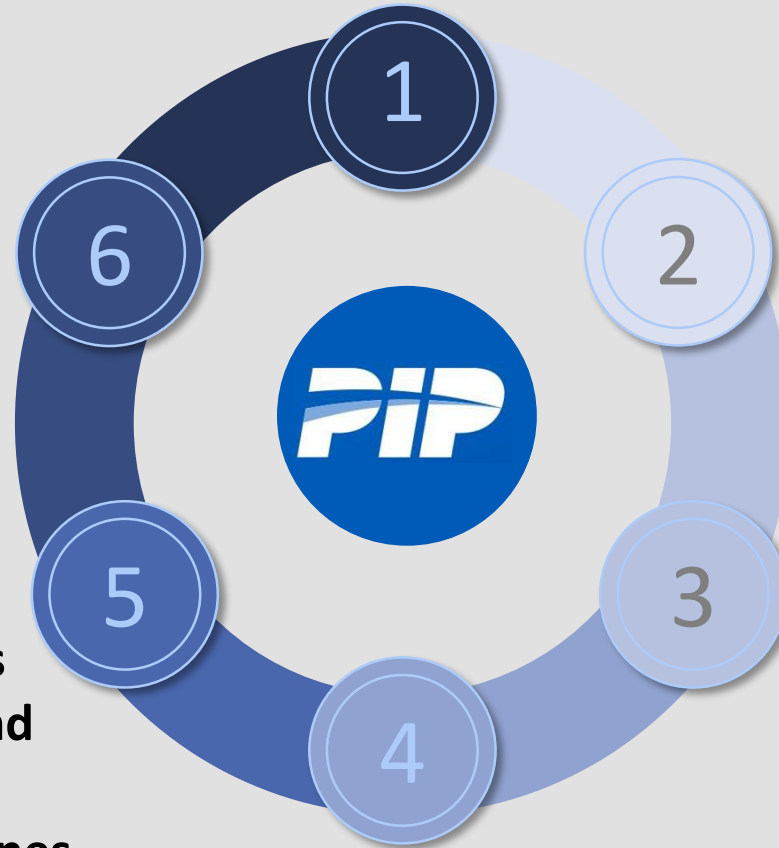
BENEFITS OF P I P



3 **Cost**
Apply industry based standards to lower overall costs.



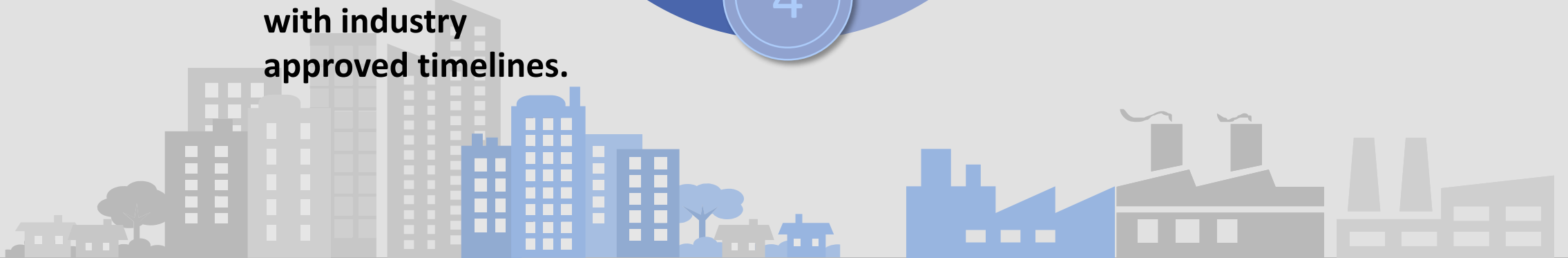
BENEFITS OF P I P



4

Schedule

Execute projects better, faster, and with industry approved timelines.



BENEFITS OF P I P



5

Sweat Equity

You and your company, get more benefit, with higher participation.



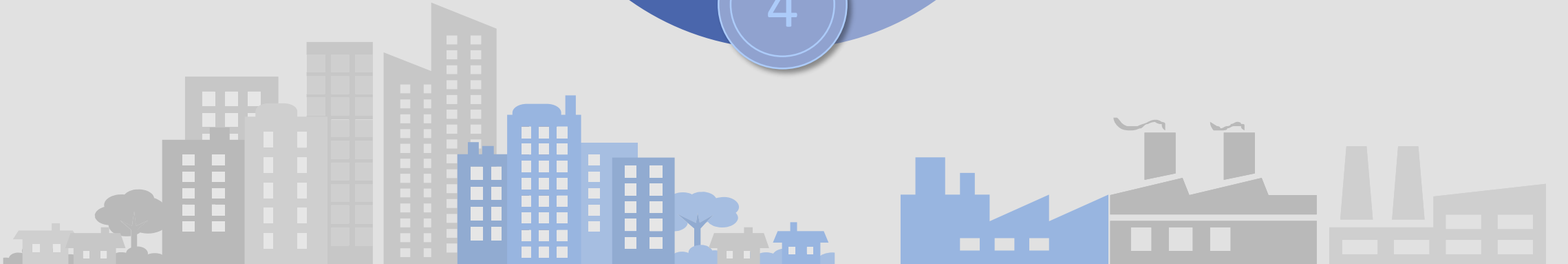
BENEFITS OF P I P



6

Active Membership

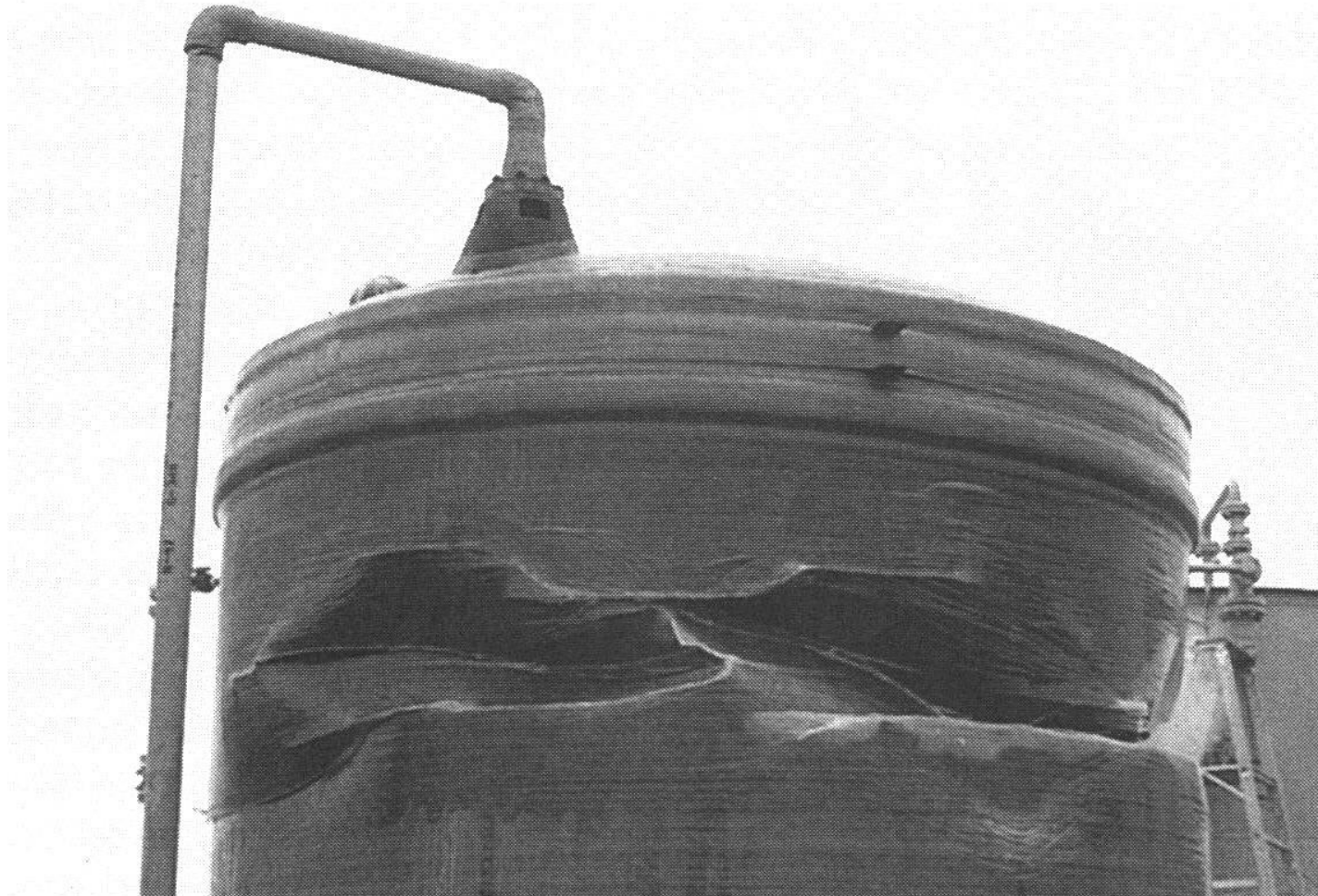
Your company can benefit greatly by increasing level of function team participation.



Are There Risks in Your Project ?



To Avoid Potential Risks



PIP Practices Positioning

Before PIP

INDUSTRY
STANDARDS

INTERNAL
STANDARDS

SITE SPECIFIC

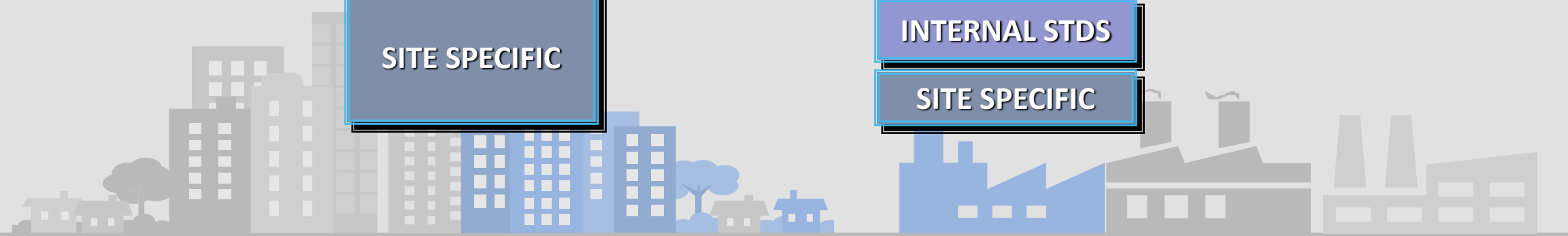
With PIP

INDUSTRY
STANDARDS

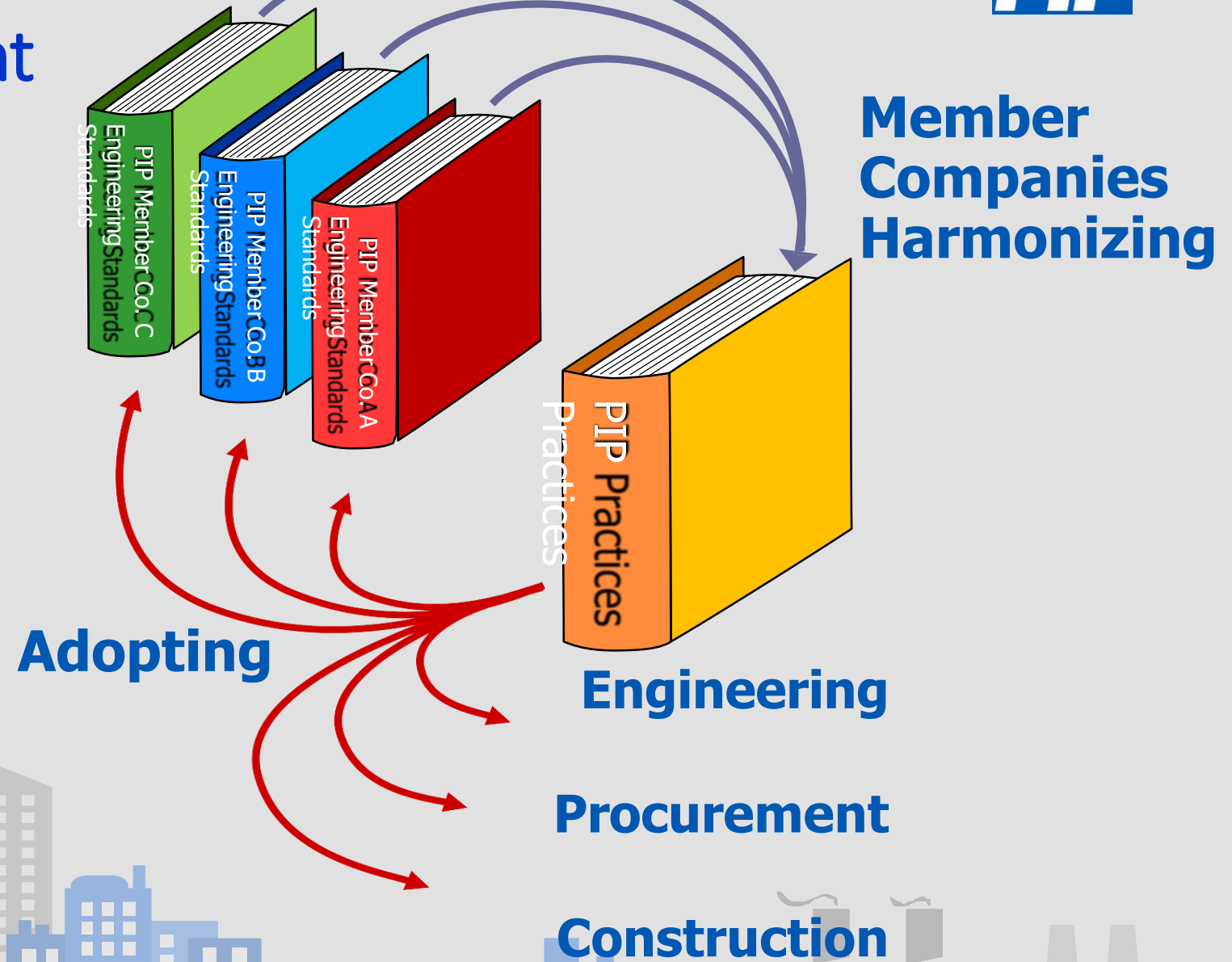


INTERNAL STDS

SITE SPECIFIC



PIP Practice Development Process



**Member
Companies
Harmonizing**

Adopting

PIP Practices

Engineering

Procurement

Construction

PIP Engineering Guideline and Criteria

- Practice Development – 6
- Architectural & Civil – 8
- Structural – 4
- Foundations – 5
- Structural Steel – 5
- Coatings/Insulation/Refractory – 6
- Electrical – 7
- Machinery – General – 6
- Pumps- 6
- P&ID – 2
- ASME B31.3 Piping General - 7
- ASME B31.3 Piping Design – 4
- Valves – 8
- ASME B31.4/8 Pipeline Systems – 4
- Hygienic Processes Piping – 2
- Process Controls - General – 9
- Process Analyzers – 5
- Process Control Valves – 6
- Process Measurement – 9
- Vessels – 5
- Heat Exchangers & Tanks - 2

116 Practices on How To Use Practices

PIP Practice Types

	CODE	TYPE	AUDIENCE
	G	General (Internal Administrative Practices)	Authors and Editors of Practices
+30	C	Criteria (Design Specification)	Engineers
	E	Engineering Guide	Less experienced Engineers
+300	S	Specification (Purchase Order or Subcontract Specification)	Vendors, Fabricators, Manufacturers, Installers, and Constructors
	F	Fabrication Details	Procurers (BoMs), Fabricators (Details), and Inspectors
	I	Installation Details	Installers, Constructors, and Inspectors
	T	Inspection and Testing Requirements	Vendors, Fabricators, Manufacturers, Installers, Constructors, Inspectors, and Start-up Teams
	D	Documentation Requirements	Vendors, Fabricators, and Manufacturers

Agenda

- P I P Overview
- **Metadata**



Metadata – Preview Teaser



KNOWLEDGE MANAGEMENT

Think About It!



ANNUAL CONFERENCE 2017

Metadata: New Word – Old Concept

Give your Data Purpose



Metadata Everywhere: Even Super Bowl LI



- No team had ever come back from more than a 10 pt. deficit to win the Super Bowl
 - Patriots came back from 25 points down...
- 1st Super Bowl to go into Overtime
- 5 Super Bowl Rings for Tom Brady
- Most Pass Attempts (62) & Completes (43)
- Most Yards by a QB (466)
- 1st QB with 3 SB 4th Quarter Comebacks

7




- Where did all this “data” come from?
- How has the data survived from the non-digital age until now?
- How is the data calculated to come up with these stats year over year?
- What is the probability that these records will ever be broken?
- What is the importance of the records that are tracked?







Question 1




“Data about data”
META-DATA

Question 1

 = 7

 = 5 + 

 = 1 + 

 +  +  = ?



Metadata: Definition

- Metadata is a new word based on an old concept
- The definition literally means “data about data”
- Most important Use: To Locate a Resource
- Alternate Terms: Mapping, Cross-Walking
- Gives your data purpose



Types of Metadata

The screenshot shows a photo gallery interface. The main image is titled "lighthouse lens reflected sky". A blue callout box labeled "Descriptive metadata" points to the image title. Another blue callout box labeled "Structural" points to the image itself. On the right side, there is a metadata panel. A blue callout box labeled "Administrative" points to the top of this panel, which includes the upload date and author. Below that, a blue callout box labeled "Descriptive" points to the "Tags" section. At the bottom of the metadata panel, a blue callout box labeled "Administrative / Rights" points to the "Additional information" section.

lighthouse lens reflected sky

Administrative

Uploaded on December 9, 2006
by [robinart.com](#)

+ robinart.com's photostream

- **lighthouses (Set)**

23 items

Part of: [photographs - all color](#)

Descriptive

Tags

- lighthouse
- lighthouses
- tybee
- tybee island
- savannah
- georgia
- lighthouse bulb
- lines
- details
- rainbow
- refracted light
- refractive
- prism
- prismatic
- blog
- robinart
- robinart.com

Administrative / Rights

Additional information

- All rights reserved
- Anyone can see this photo
- Taken with a Canon EOS Digital Rebel XSi

Would you like to comment?
[Sign up](#) for a free account, or [sign in](#) (if you're already a member).



Common uses of Metadata

Ask Your
Teenager

- **Locate Resources**

- Dewey Decimal System
- #Haveyoueverusedahashtag

- **Resource Discovery**

- Finding resources relevant to one's search
- Bringing similar resources together

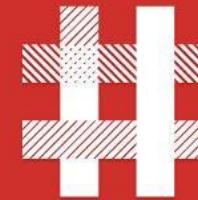
- **Find relevant data to create statistics**

- Finding a data point in one spec and finding its relative source for analysis in another spec (Cross-Walking)

- **Metadata is key to ensure long data life**

- Track the lineage of a digital object
- Document its behavior for future technologies
- See PIP DMEDC001 for additional details

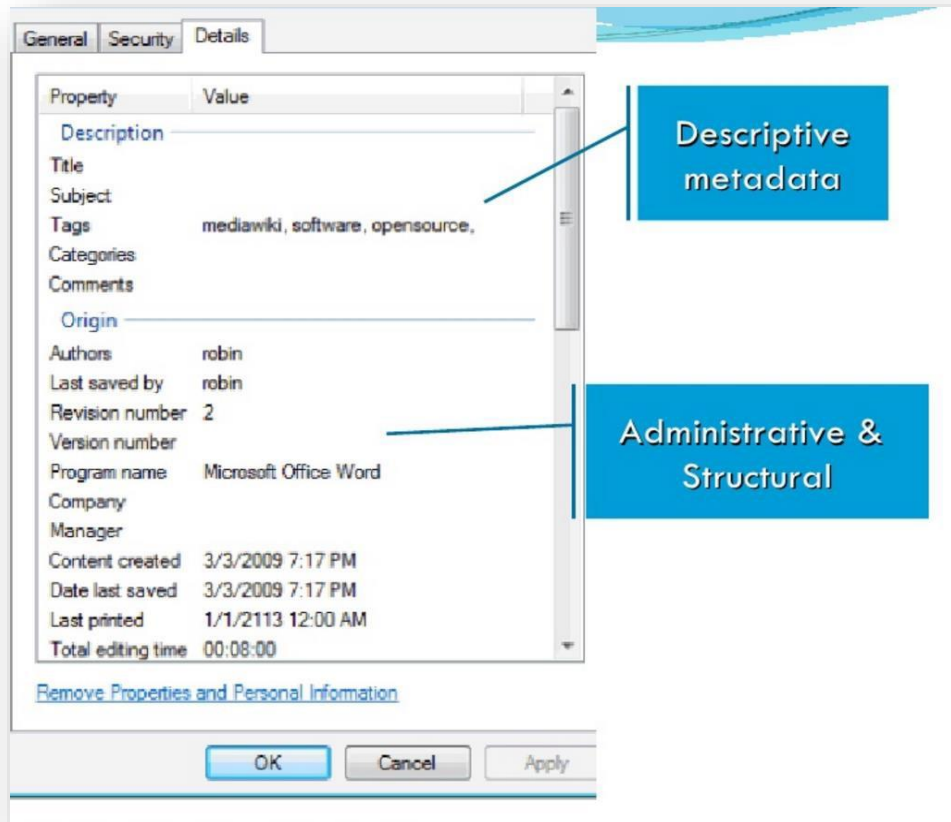
What exactly is



a #hashtag?



Microsoft and Metadata



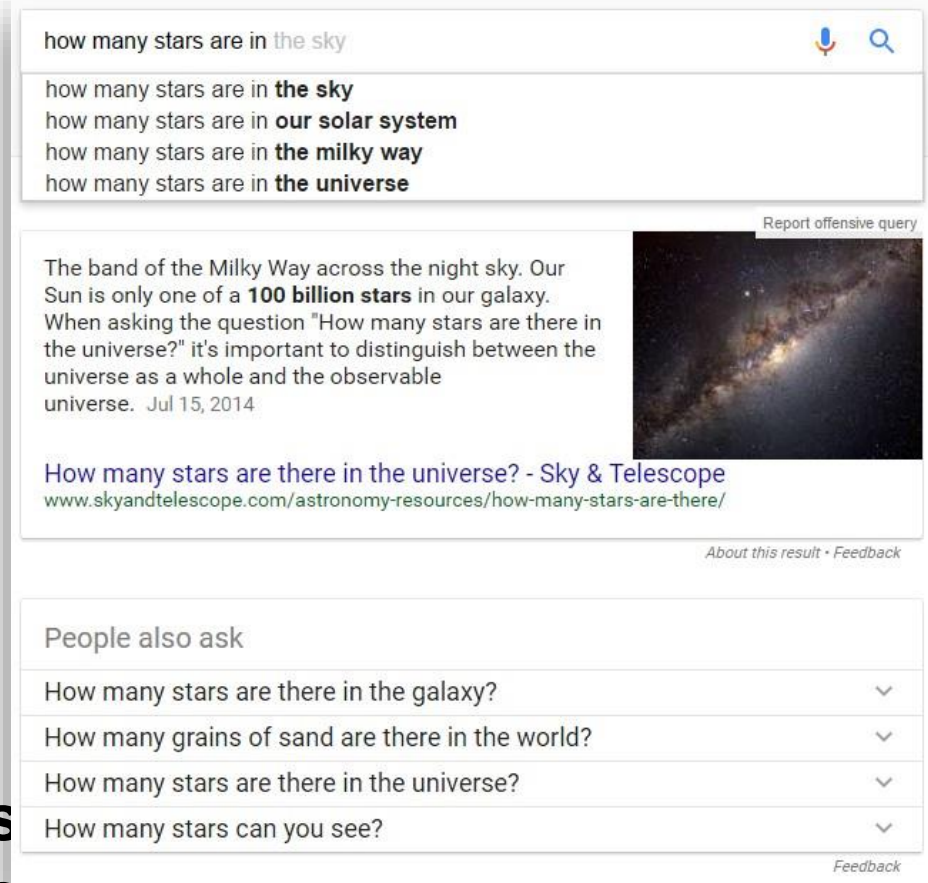
Microsoft has been adding metadata to its documents for years; often based upon which user created the document.

Newer versions allow this information to be changed more easily. PDF Creators also allow the creation and editing of metadata.

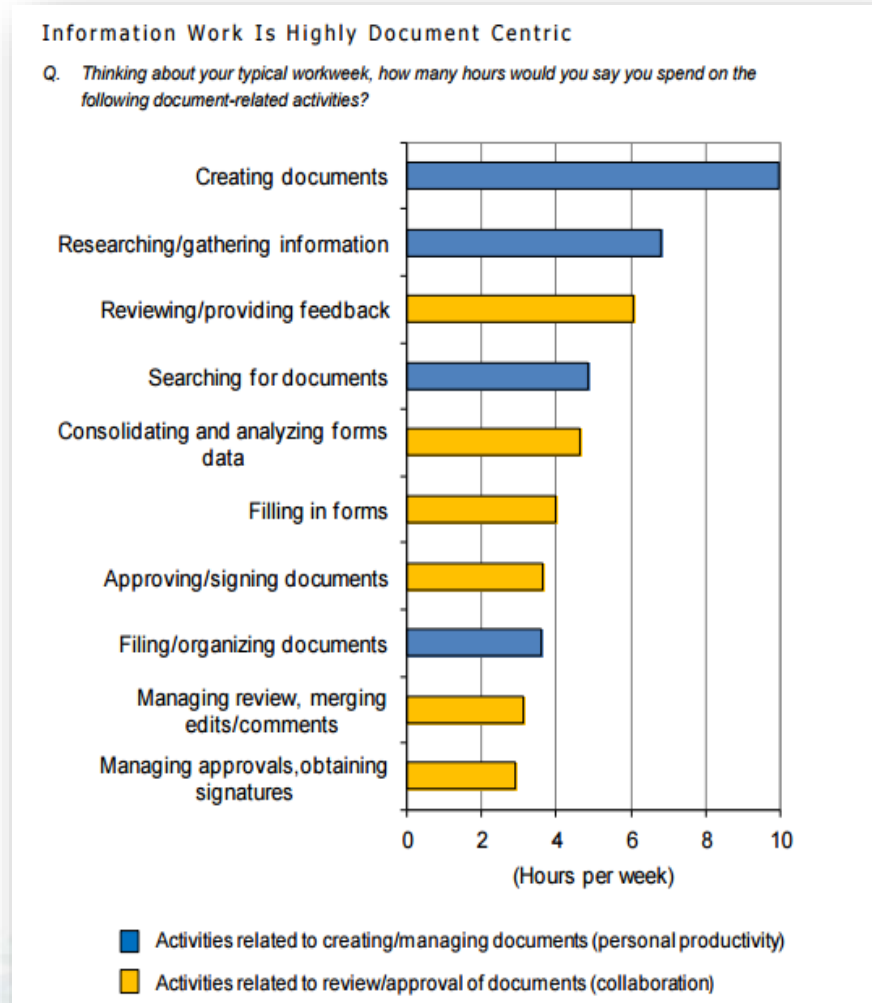


How many times per day do you “Google”?

- Did you know that Google records literally every search item that is typed in the query box?
- Google processes over 40,000 search queries every second
- 3.5 Billion searches per day and 1.2 Trillion searches per year
- Every person in this room has contributed to the “World Wide Web” of metadata



How long does it take to find your information?



- When you access specs, how long does it take to find what you were looking for?
- Does the current technology aide you in your efforts, or does it create obstacles?
- Yes, I spent over 1 hour trying to find this type of graph.



Knowledge Graph – Smarter Searching

About 21,200,000 results (0.77 seconds)

Houston Rockets
43-19, 3rd in Western Conference


Final - Yesterday, 9:30 PM
Staples Center, Los Angeles, California

 Houston Rockets (43-19)	122
 Los Angeles Clippers (36-24)	103




Box Score





All times are in Central Time


 Schedule and scores

Top stories

		
<p>Rockets get hot from 3-point range, overwhelm Clippers</p> <p>ESPN.com · 7 hours ago</p>	<p>Rockets vs. Clippers: Score, Highlights, Reaction from 2017 Regular Season</p> <p>Bleacher Report · 8 hours ago</p>	<p>For Mike D'Antoni, Rockets there's no such thing as too many three-pointers</p> <p>USA Today · 2 hours ago</p>

Houston Rockets  

Basketball Team

 nba.com/rockets

The Houston Rockets are an American professional basketball team based in Houston, Texas. The Rockets compete in the National Basketball Association, as a member club of the league's Western Conference Southwest Division. Wikipedia

Head coach: Mike D'Antoni
Arena/Stadium: Toyota Center
Mascot: Clutch
Owner: Leslie Alexander
Location: Houston, TX
NBA championships: 1995, 1994

Roster

James Harden Point guard	13
Eric Gordon Shooting guard	10
Nenê Center	42

[View 10+ more](#)



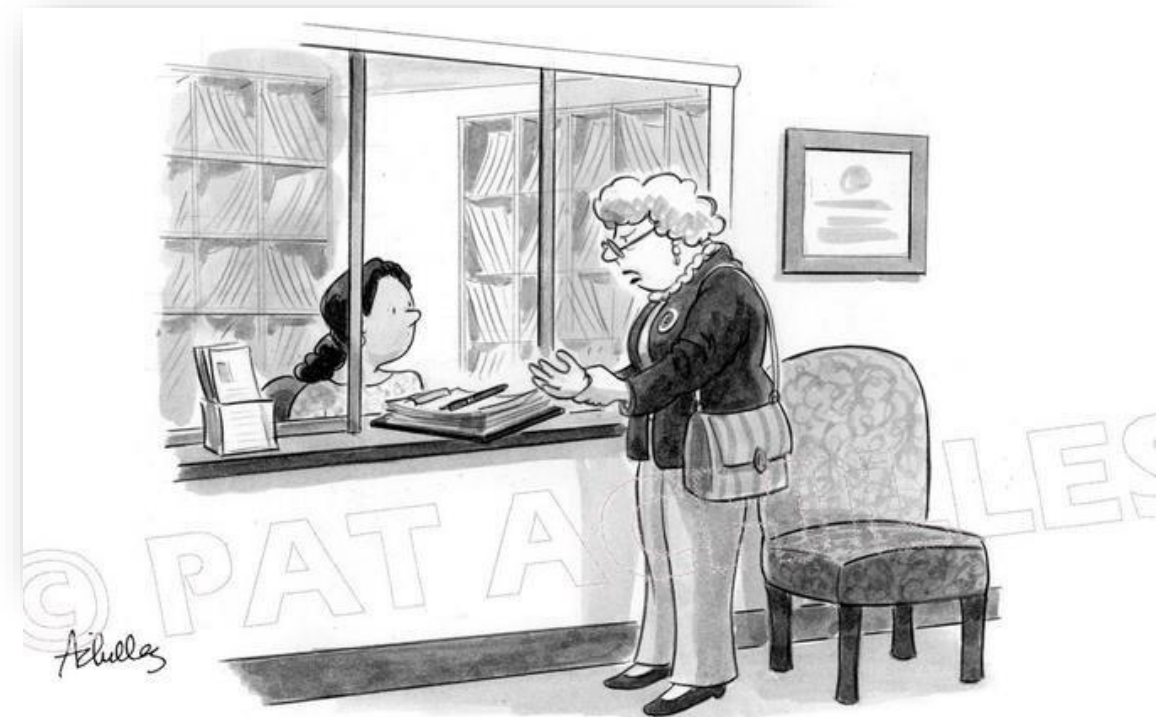
Metadata Pitfalls – Think “WebMD Symptoms”

- Too Much Data
- Misleading Results
- Metadata Tagging Errors
- Making Incorrect Data Connections

Web MD

(proper noun)

Something that makes
a mild cold into a
deadly disease that will
kill you within the next
24 hours.



“I felt fine when I got here for my checkup.
Now that I filled out all your forms, I think I have carpal tunnel.”



PIP Director's Report

Michael Poehl

Director

**Process Industry
Practices**

December 5, 2018



Agenda

- P I P Overview
- Metadata
- **P I P Metadata FT**



Think “Google Search” for P I P

- **What if...**
 - You could type in any reference keyword, from any specification
 - You could draw a sound conclusion based on the facts presented
 - You could calculate the money saved by making an engineering decision
 - You could interpret what you searched in seconds



Most popular job by state



Four V's of BIG DATA

40 ZETTABYTES

(40 TRILLION GIGABYTES) of data will be created by 2020, an increase of 300 times from 2005



It's estimated that **2.5 QUINTILLION BYTES**

(2.5 TRILLION GIGABYTES) of data are created each day



Volume
SCALE OF DATA

6 BILLION PEOPLE have cell phones



WORLD POPULATION: 7 BILLION

Most companies in the U.S. have at least **100 TERABYTES** (100,000 GIGABYTES) of data stored



The FOUR V's of Big Data

From traffic patterns and music downloads to web history and medical records, data is recorded, stored, and analyzed to enable the technology and services that the world relies on every day. But what exactly is big data, and how can these massive amounts of data be used?

As a leader in the sector, IBM data scientists break big data into four dimensions: **Volume, Velocity, Variety and Veracity**

Depending on the industry and organization, big data encompasses information from multiple internal and external sources such as transactions, social media, enterprise content, sensors and mobile devices. Companies can leverage data to adapt their products and services to better meet customer needs, optimize operations and infrastructure, and find new sources of revenue.

By 2015, **4.4 MILLION IT JOBS** will be created globally to support big data, with 1.9 million in the United States



As of 2011, the global size of data in healthcare was estimated to be

150 EXABYTES

(150 TRILLION GIGABYTES)



30 BILLION PIECES OF CONTENT are shared on Facebook every month



By 2014, it's anticipated there will be **420 MILLION WEARABLE, WIRELESS HEALTH MONITORS**

4 BILLION+ HOURS OF VIDEO are watched on YouTube each month



400 MILLION TWEETS are sent per day by about 200 million monthly active users

Variety
DIFFERENT FORMS OF DATA



The New York Stock Exchange captures

1 TB OF TRADE INFORMATION

during each trading session



Velocity
ANALYSIS OF STREAMING DATA



Modern cars have close to **100 SENSORS** that monitor items such as fuel level and tire pressure

By 2016, it is projected there will be

18.9 BILLION NETWORK CONNECTIONS

— almost 2.5 connections per person on earth



1 IN 3 BUSINESS LEADERS

don't trust the information they use to make decisions



Poor data quality costs the US economy around

\$3.1 TRILLION A YEAR



27% OF RESPONDENTS

in one survey were unsure of how much of their data was inaccurate

Veracity
UNCERTAINTY OF DATA

Engineering has BIG DATA

Engineering Associations and their “Founded Date”

- ASCE 1852
–(oldest national engineering society in the USA)
- ASME 1880
- ASTM 1898
- ANSI 1918
- API 1919
- IEEE 1963
- **Internet 1991**
- **PIP 1992**

So, three engineers are driving down a country road when the car sputters and stops. The first guy, a mechanical engineer says "It's the carburetor. I can fix that." The second guy, an electrical engineer says "No, it's just the battery cable. I can fix that." The third guy, a software engineer for Microsoft, says "Why don't we just get out, then back in?"

– We have over 150 years of “data” and “knowledge management” to capture, learn from and preserve for the future.



PIP Director's Report

Michael Poehl

Director

**Process Industry
Practices**



PIP Director's Report



Michael Poehl

Director

**Process Industry
Practices**



PIP Director's Report



Michael Poehl

Director

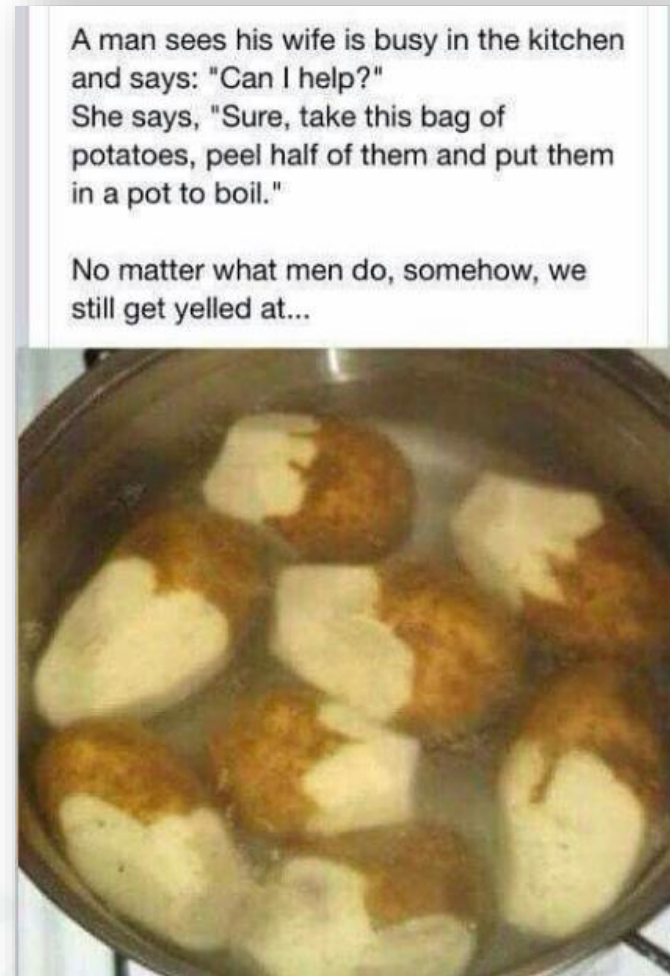
**Process Industry
Practices**

December 5, 2018



Google – Metadata Wizards!

- Can anyone guess how many pages make up the “World Wide Web” today...?
- **Google Knowledge Graph**
 - Crawls the web by following links from page to page.
 - It then sorts the pages by their content and other relevant factors
 - It is then put into “The Index” over 100 Million Gigabytes of storage
 - Over 200 factors are considered before google displays your results
 - You get 100 million results, in roughly fraction of 1 second...



Save money ... not metadata


The screenshot shows the Southwest Vacations website interface. At the top, a blue banner asks "Where's next on your bucket list?" and offers "Save \$100 on U.S. destinations" and "Save \$200 on international destinations." Below this is a search bar with the text "Search for where you want to go?". The navigation menu includes "Southwest Vacations", "DEALS What's on sale", "DESTINATIONS Where to go / What to do", "VACATION THEMES Shop by theme", and "CUSTOMER CARE How can we help?". The main content area features a "Book a vacation, save when you bundle" section with a form for package type (Flight + Hotel + More), departure (Houston - Hobby (HOU)), arrival (Oakland, CA (OAK)), departure date (6/30/2017), and return date (7/6/2017). There are also fields for adults (2), children (1), and child 1 age (5). A "Where's next on your bucket list?" carousel banner is visible, along with a "Sign up for exclusive offers" button.

- Did you know websites collect data about your frequent searches and will actually display “increased” pricing based on your frequent queries?
- Make sure your searches for vacations aren’t costing you “metadata” related money.



PIP Metadata – WHAT'S NEXT?

How can you make
the following equation
correct
without changing it?

$$8 + 8 = 91$$
A cartoon illustration of a young boy with glasses, wearing a yellow shirt and blue pants, standing on a small patch of grass. He is holding a blue book and looking thoughtful. A thought bubble above his head is empty, suggesting he is pondering a problem.

***Disclaimer:** PIP is not a software developer, but it can help standardize the metadata that software companies use, thus making it possible, and easier for data management and transfer throughout various design systems.*



What does Metadata mean for PIP?

Metadata Function Team

Mission Statement:

Promote awareness and coordinate the discovery, documentation, harmonization, use and reuse of data using best practices.

Long Range Objectives (5-10 years to achieve)

- Develop Metadata communication/transfer beyond PIP

Medium Range Objectives (2-5 years to achieve)

- Develop an Electrical data elements list (similar to DMDIM001) from the Electrical Practices datasheets

Short Range Objectives (<2 years to achieve)

- Develop MDFT Charter document
- Hyperlink the internal PIP References in the Practices (concentrated effort for all Practices; existing and new)
- Develop guidelines for coordinating the assignment of data labels and fields
- Develop an initial PIP “data dictionary”
- Develop a Metadata Management Process
- Develop a Data/Metadata Stewardship Program (See Note)
- Create a Metadata Strategy / Practice
- Adopt / existing industry Metadata Standards
- Identify Appropriate Metadata Tools
- Implement Metadata Management across the PIP organization



PIP SPECS – Knowledge Management

- **Think About It**

- When was the last time you printed out a spec to read it?
- When was the last time you referred to a handbook sitting in a shelf vs. looking online?
- Have you ever wondered where the spec developers got their values from?
- Have you ever seen a spec refer you to 10 other relevant specs?
- Have you ever uploaded an old specification (non-digital) and then tried to run a search?

- **If you answered yes to any of these questions, you are yearning for Metadata!**

I'VE NEVER
METADATA
THAT I DIDN'T LIKE



PIP METADATA

- Metadata tags must be added at the native document level
- Links must be created before the document converts to PDF
- [PCCFL001 – with Metadata](#)

2.1 Process Industry Practices (PIP)

- [PIP PCCGN001](#) - *General Instrument Design Checklist*
- [PIP PCCGN002](#) - *General Instrument Installation Criteria*
- [PIP PCIDP100](#) - *Differential Pressure Installation Details*
- [PIP PNF0200](#) - *Vent/Drain/Instrument Connection Details*

2.2 Industry Codes and Standards

- [American Gas Association \(AGA\)](#)
- [American National Standards Institute \(ANSI\)](#)
 - ANSI-2530/API-14.3/AGA-3/GPA-8185 - *Natural Gas Fluids Measurement - Concentric, Square-Edged Orifice Meters*
 - Part 1 General Equations and Uncertainty Guidelines
 - Part 2 Specification and Installation Requirements
 - Part 3 Natural Gas Applications
 - Part 4 Background, Development, Implementation Procedures and Subroutine Documentation



PIP and Metadata – Looking Forward ?

- Think about specs as packages rather than standalone documents.
- Activate “Metadata” within each spec to provide active references to other specs.
- Create numerical references for young engineers to learn from our experience.
- Start to get a handle on the data that we have & build on our knowledge management.
- Build on the specification database, make it the “GOOGLE” of PIP



Collective Wisdom
No one is as smart as all of us. PIP has 10,000 years of combined engineering experience in one place.

Capital Project Savings
Members share the goal of reducing total installed costs of process plants by up to 5% through the implementation of common industry practices.

Lower Costs
Up to 70% reduction in costs for generating and maintaining internal company standards.

Up To Date
PIP is focused on staying current to maintain value in all PIP Practices.



- We don't need SMART DATA, we need to get SMART about DATA.



PIP SPECS

- Create Smart Specs
- Instead of all entities speaking our own language, **start creating a universal language**
- We have worked for the development of millions of data points, isn't it time we start making our data work for us?
- **Metadata is our window to the past, our door to the present, and our gateway to the future.**



Select 3 balls and put into the circles, total of sum must be 30.



PIP – WHAT

- If it looks like a
- Duck

- If it walks like a
- Duck

- If it sounds like a
- Duck

- It is probably a
- Duck



PIP – NOT D u c k

D U c k

D U C k

D U C k

D U C K

D u c k



A B E T Philosophy for Chem E

None of us is as smart as ALL of us !

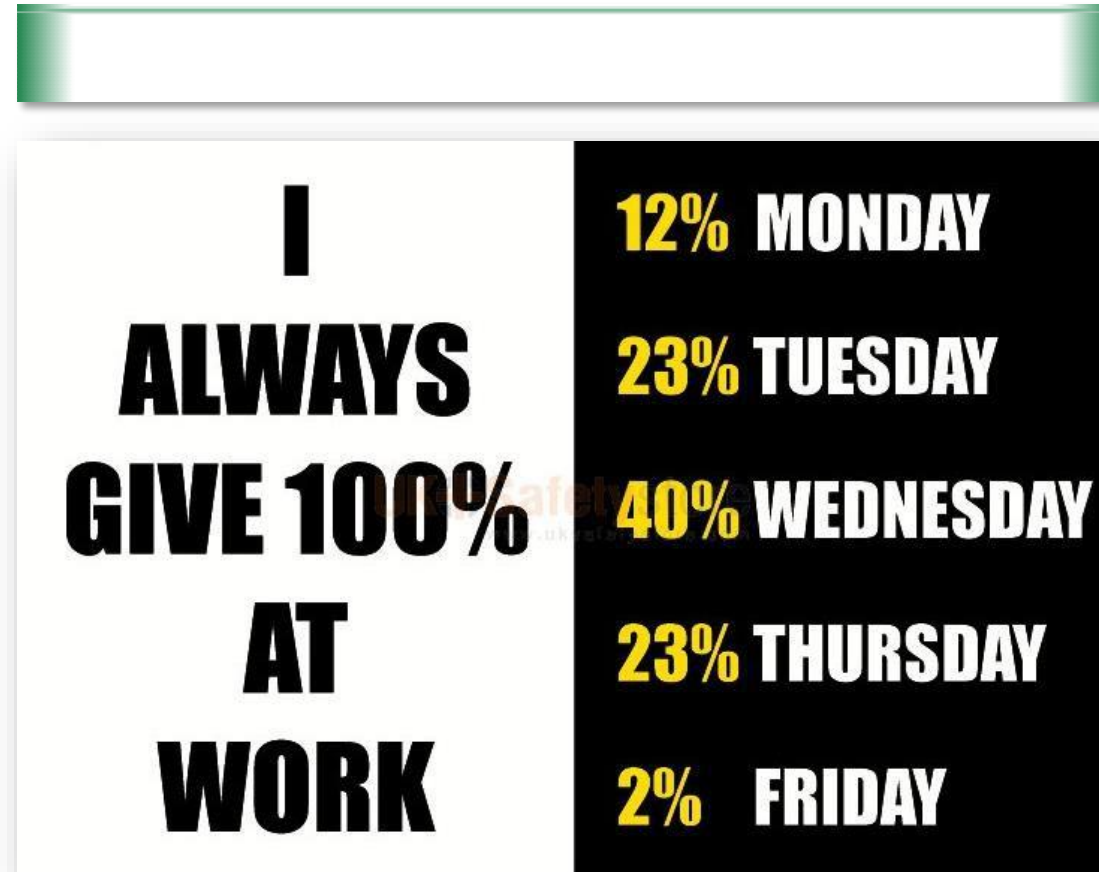


PIP - Collaboration

- Interoperability
- ISO Connection
- Focus on the WHAT
for P I P



And the Answer is...All Figures Lie, Especially %s



Agenda

- P I P Overview
- Metadata
- P I P Metadata FT
- **Questions ?**



PIP Website: <http://www.pip.org>

Marjorie Wilcox: marketing@pip.org

Michael Poehl: director@pip.org

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- **Questions**

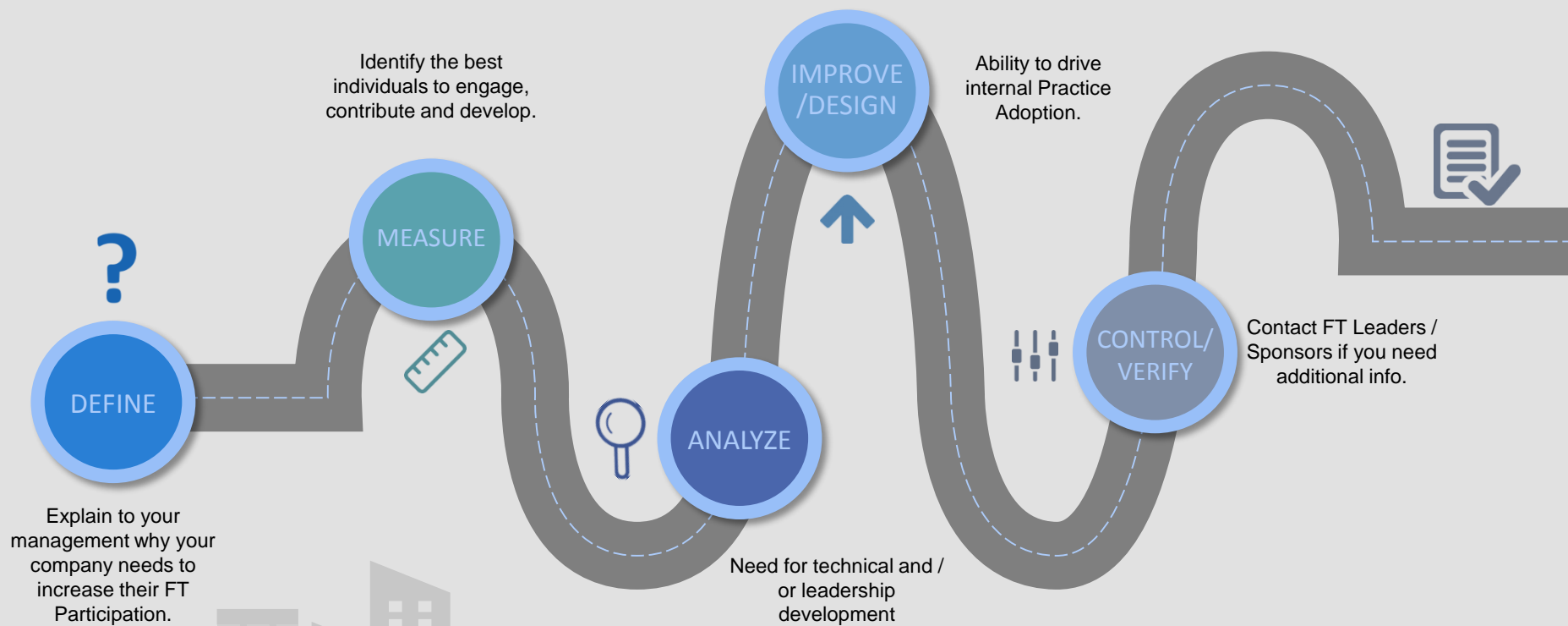


- **Back-Up Slides**

Piping Database Development

- **Hexagon assistance**
 - Upgraded PIP SRD instance to new program update (January)
 - Migrated PIP PMS data from Hexagon SRD to PIP SRD instance (Approximately 70 PMS Practices) (April)
 - Continued to provide training via webcons
 - Developing Excel export for use by PIP reviewers
 - Updating the PIP report format with changes required by Piping FT
- **PIP Office progress**
 - Updated the PIP Excel Piping Components Spreadsheet with data from current PIP Piping Material Specs (128 metallic PMSs)
 - Started working on input of data for one Practice into SRD
 - Proper set up of valve descriptions is difficult in SRD
- **PDTT meeting monthly by webcon**
 - Helping with SRD/PMS related questions
 - Needs to develop a work process for reviewing the database

PIP ROAD MAP



Provide names and contact information to Lindsay Whelchel—info@pip.org

Managing Complex Change



Adapted from Knoster, T. (1991) Presentation in TASH Conference. Washington, D.C. Adapted by Knoster from Enterprise Group, Ltd.

