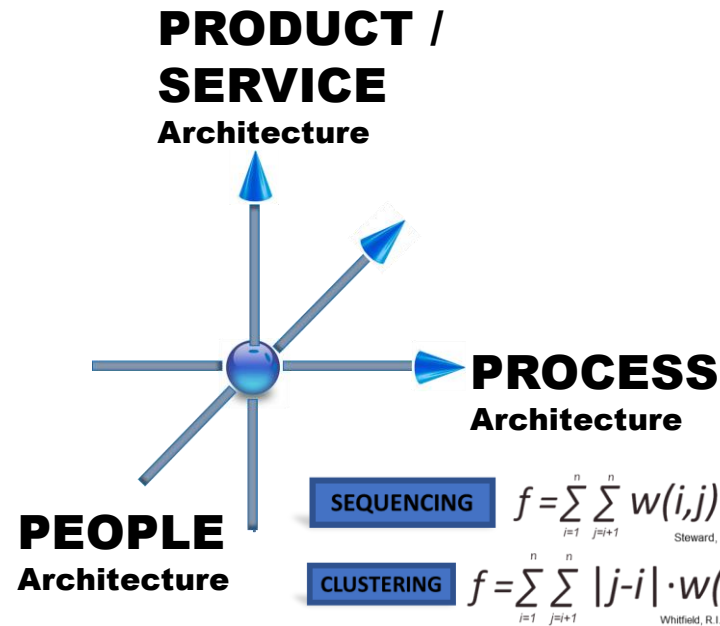


Integration Planning with DSM (IP/DSM)



- A1.1 Capture Integration Objectives
- A1.2 Capture Constraints
- A1.3 Capture Product Dependencies
- A1.4 Capture Process Dependencies
- A1.5 Capture People Dependencies

- A2.1 Assign Unique IDs
- A2.2 Confirm Single Source Definitions
- A2.3 Assign Version Control
- A2.5 Manage Database Properties

CAPTURE

NORMALIZE

INTEGRATE

MODEL

ANALYZE

- A5.1 Review Objectives
- A5.2 Review Constraints
- A5.3 Review Analyses
- A5.5 Perform Gap Analyses
- A5.6 Perform Impact Analyses

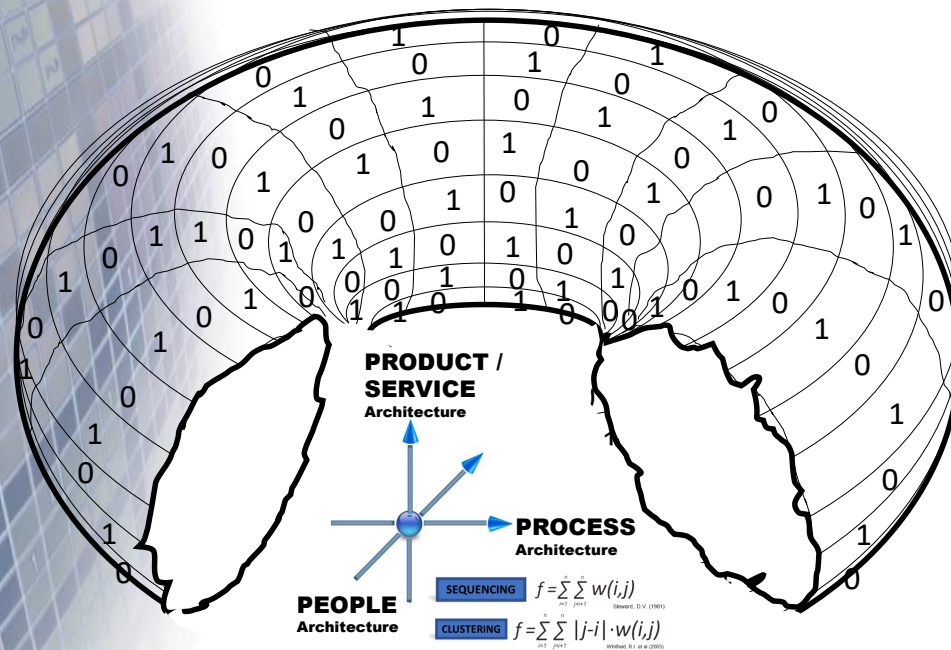
- A3.1 Select Modeling Techniques
- A3.2 Map Dependencies
- A3.3 Assign Properties
- A3.4 Assign Version Control

- A4.1 Set Analysis Parameters
- A4.2 Perform Sequence Analyses
- A4.3 Perform Cluster Analyses
- A4.4 Perform Schedule & Cost Analyses

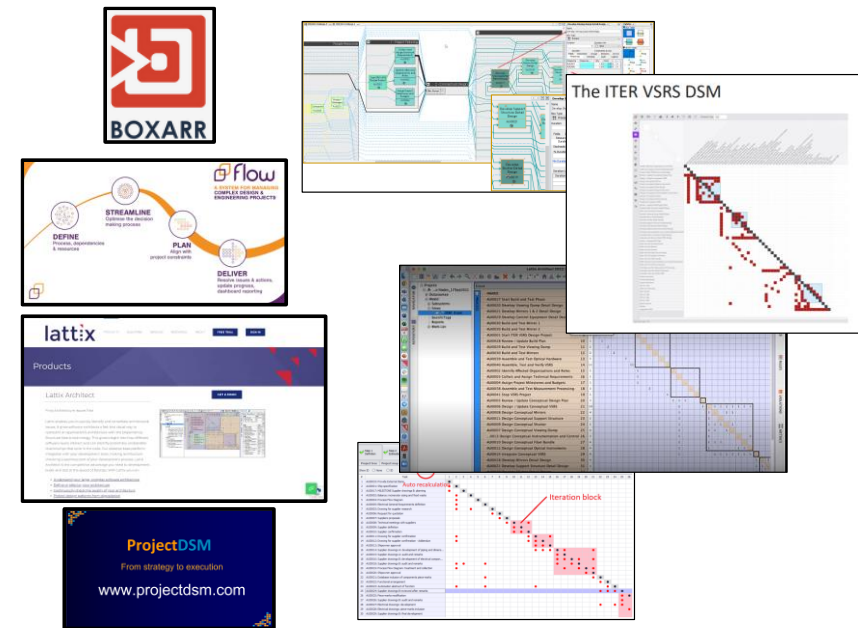
Contents

- ☐ Motivation
- ☐ What's a DSM?
- ☐ 25-year Silver Jubilee DSM Conference
- ☐ Thermonuclear Fusion Application
- ☐ IP/DSM Summary
- ☐ DSM Symbiotic Technologies
- ☐ IP/DSM Phases / Tasks
- ☐ Benefits / Next Steps / Questions?

.....a concept inspired by the 24th international DSM Conference collaboration with DIFFER and TU/e, October 2022, Eindhoven, Netherlands, using the historical and current challenges of the dynamic and complex thermonuclear fusion community's ITER project.



DSM Symbiotic Technologies (DST)



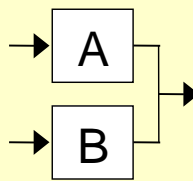
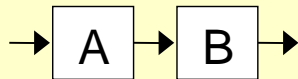
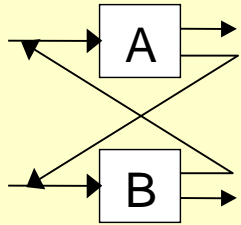
2022 DSM Workshop Using ITER VSRS Subsystem

DIFFER – Dutch Institute for Fundamental Energy Research
TU/e – Technical University / Eindhoven
ITER – International Thermonuclear Energy Reactor

What's a DSM?

~12 mins. YouTube 3-part MIT Tutorial

- A Dependency Structure Matrix (DSM)* is a compact, matrix representation of a system.

Relationship	Parallel	Series	Coupled (Loop)																											
Graphic Representation	 (CPM)	 (CPM)	 (not allowed in CPM)																											
DSM Representation	<table><tr><td></td><td>A</td><td>B</td></tr><tr><td>A</td><td></td><td></td></tr><tr><td>B</td><td></td><td></td></tr></table>		A	B	A			B			<table><tr><td></td><td>A</td><td>B</td></tr><tr><td>A</td><td></td><td></td></tr><tr><td>B</td><td>X</td><td></td></tr></table>		A	B	A			B	X		<table><tr><td></td><td>A</td><td>B</td></tr><tr><td>A</td><td></td><td>X</td></tr><tr><td>B</td><td>X</td><td></td></tr></table> (indicates iteration)		A	B	A		X	B	X	
	A	B																												
A																														
B																														
	A	B																												
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B	X																													
	A	B																												
A		X																												
B	X																													

- Element names are placed down the 'row' side of the matrix and also across the 'column' top of matrix in the same order.
- Conceptual level Interactions identified by 1, 0, or X in intersecting cells.
- Description of interactions can be identified by names of inputs and outputs.
- Diagonal elements do not have meaning.

* AKA: Design Structure Matrix

2023 DSM Conference Silver Jubilee



The 25th International DSM Conference
Gothenburg, Sweden, October, 03 - 05, 2023

1960s use by Don Steward et al
Mathematical Systems of Equations

International DSM Conf.
(MIT, USA 1999)

On-site Regular fee	€530 *
On-site Design Society fee	€450 *
On-site Student fee	€350 *
Daily On-line fee	€150 *
* (See early bird discount)	



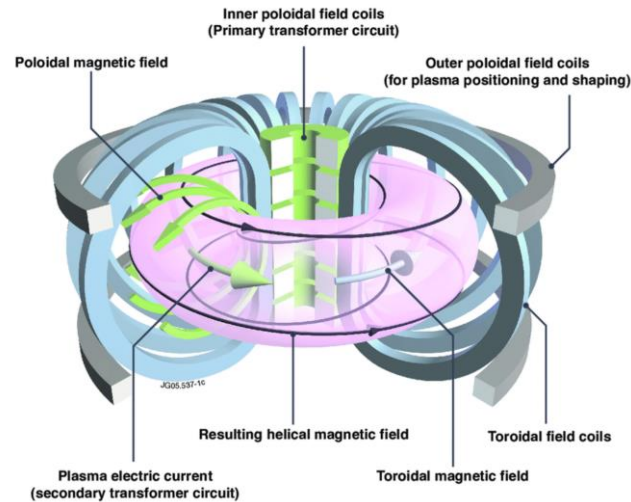
International DSM Conf.
Gothenburg, Sweden

Oct. 3-5, 2023

25th

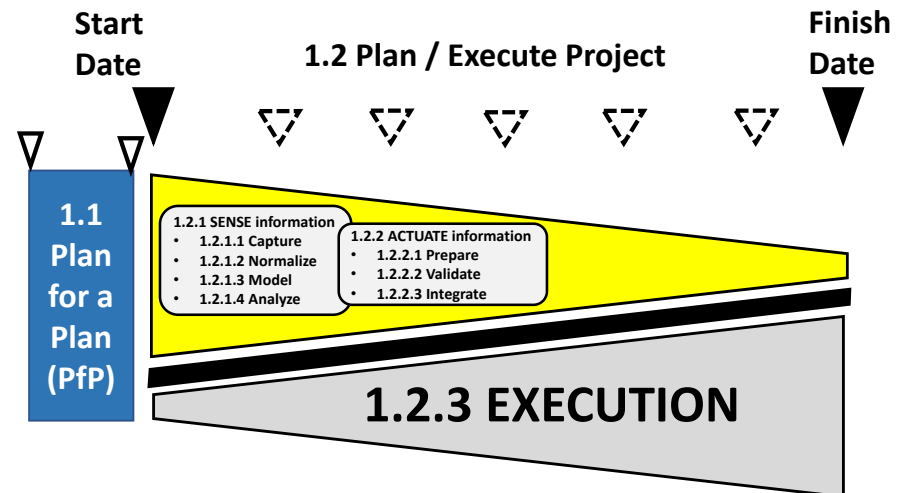
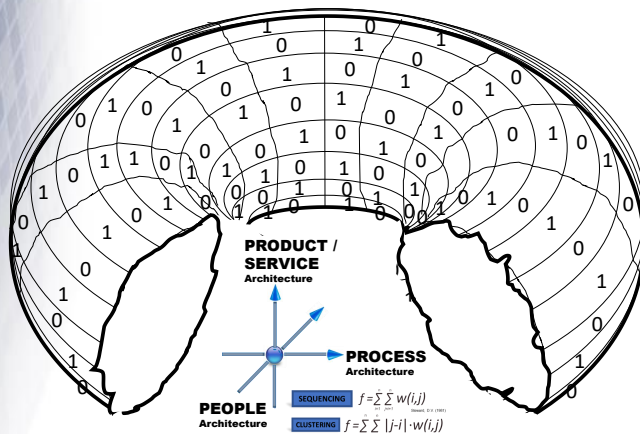
Jubilee Institutional Sponsor interest?

...Looking at a typical
Thermonuclear Fusion
Plasma Control System..



- Start-up
- Position, shape, control
- Exhaust
- Control profile
- Control MHD

...can we architect a dynamic multi-dimension planning system



for complex projects?

DIFFER, using Systems Engineering for...

Systems engineering at DIFFER

Posted on August 10, 2021

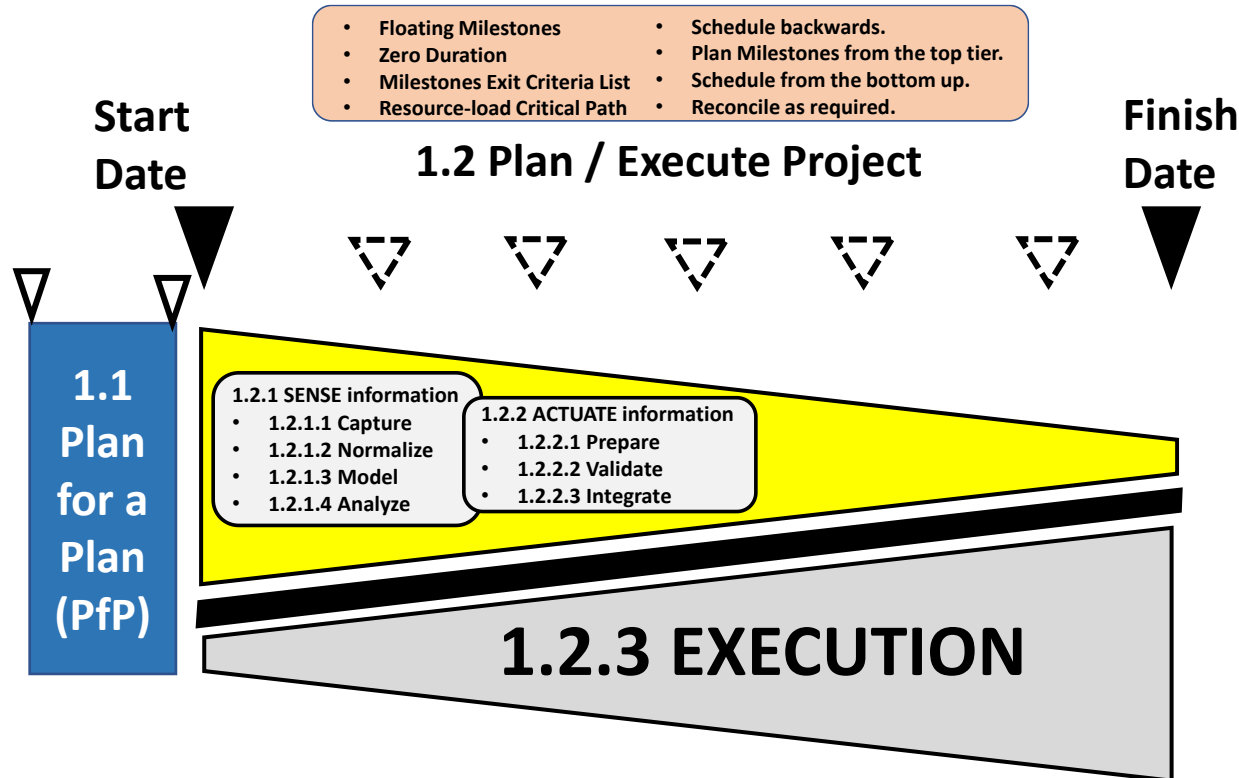


Ratio is supporting the Dutch Institute For Fundamental Energy Research (<https://www.differ.nl>) in creating a conceptual design and gathering, quantifying, and specifying the requirements for a new Ion Beam Analysis (IBA) facility. The IBA facility is to be used for fundamental material research. For example, to investigate and develop materials to allow for more efficient solar cells or more efficient hydrogen production.

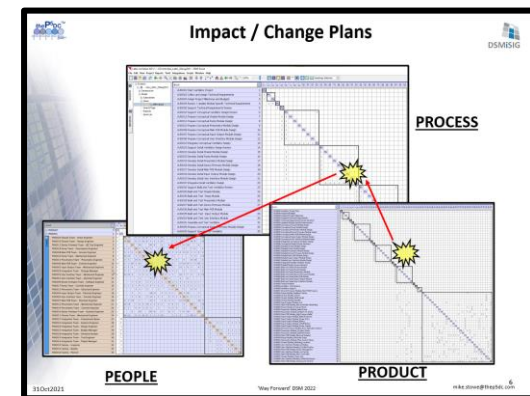
ADDRESS

Klokgebouw 150
5617 AB
Eindhoven
The Netherlands

Integration Planning with DSM (IP/DSM)



- Use DSM to..
 - Validate Exit Criteria List
 - Visualize Tasks Sequence, Parallel, Coupled
 - Confirm Functional / Spatial Product Clusters
 - Evaluate Organization Structures
 - Perform Impact Analyses
- Export task logic to Scheduling Tools



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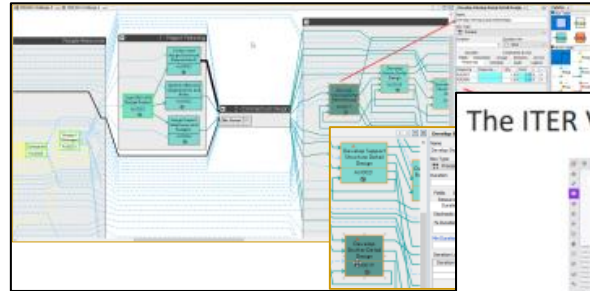
A3.4 Assign Version Control

A4.1 Set Analysis Parameters

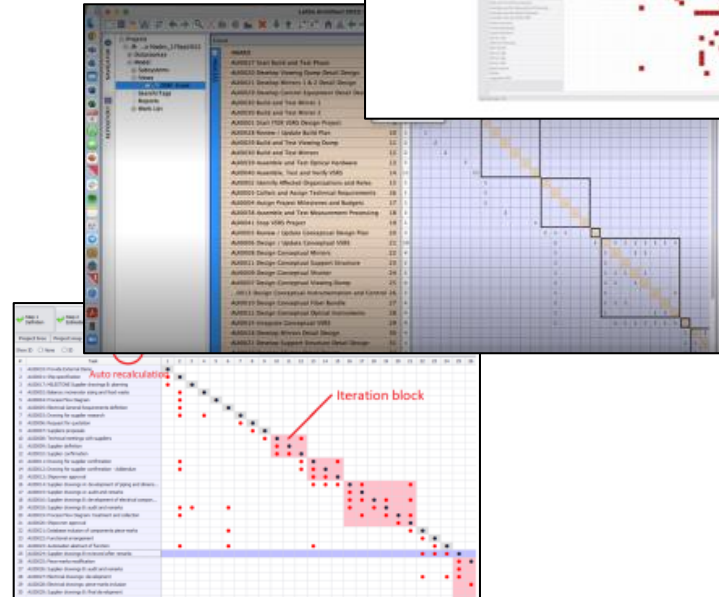
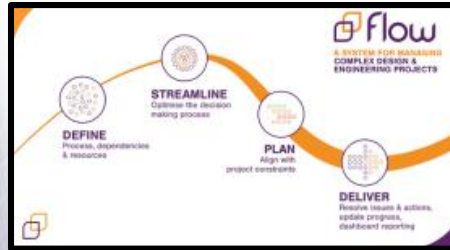
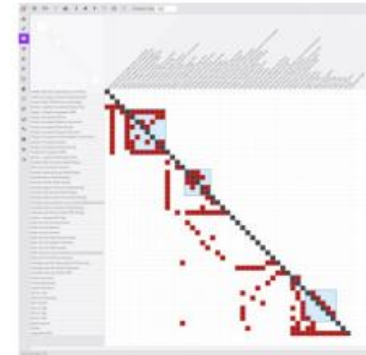
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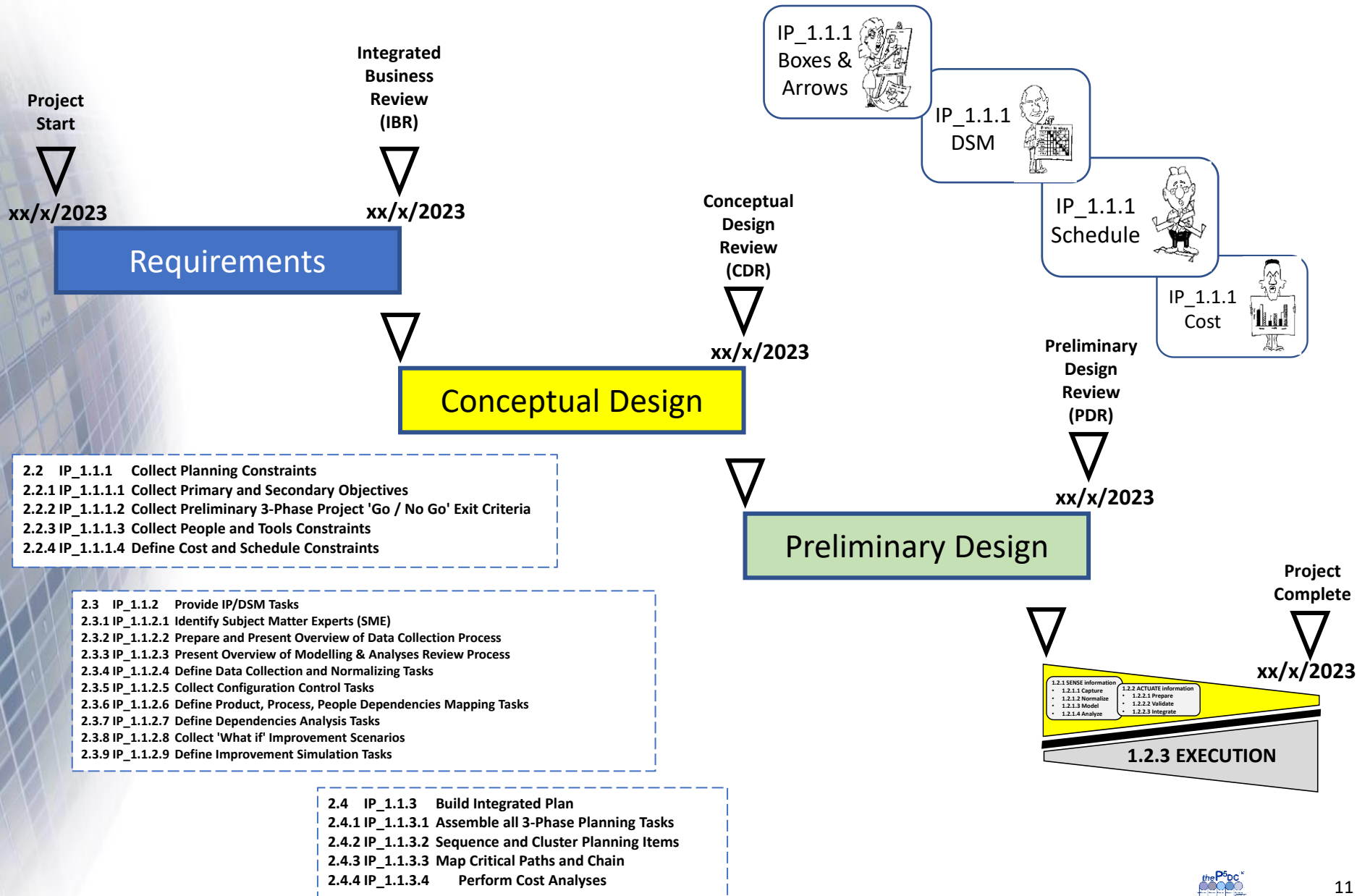


The ITER VSRs DSM



...and Others
(i.e. LOOME0, IQUAVIS, etc)

Plan for Planning (PfP)



- **Benefits**

- Improved visualization of technical, cost and schedule risks.
- More accurate multi-domain (product, process, people) **gap** analyses.
- More accurate multi-domain (product, process, people) **impact** analyses.
- Increase opportunities for innovation in product development phase.
- Supports rapid change management in production phases.

- **Next steps**

- Motivate industry contacts to self-pace introduction to DSM technology.
- Support application of IP/DSM in simple industry workshops.
- Make plans to apply IP/DSM to more complex industry workshops.

