Product Development Value Stream Mapping Manual (PDVSM)

Presented By
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Acknowledgements

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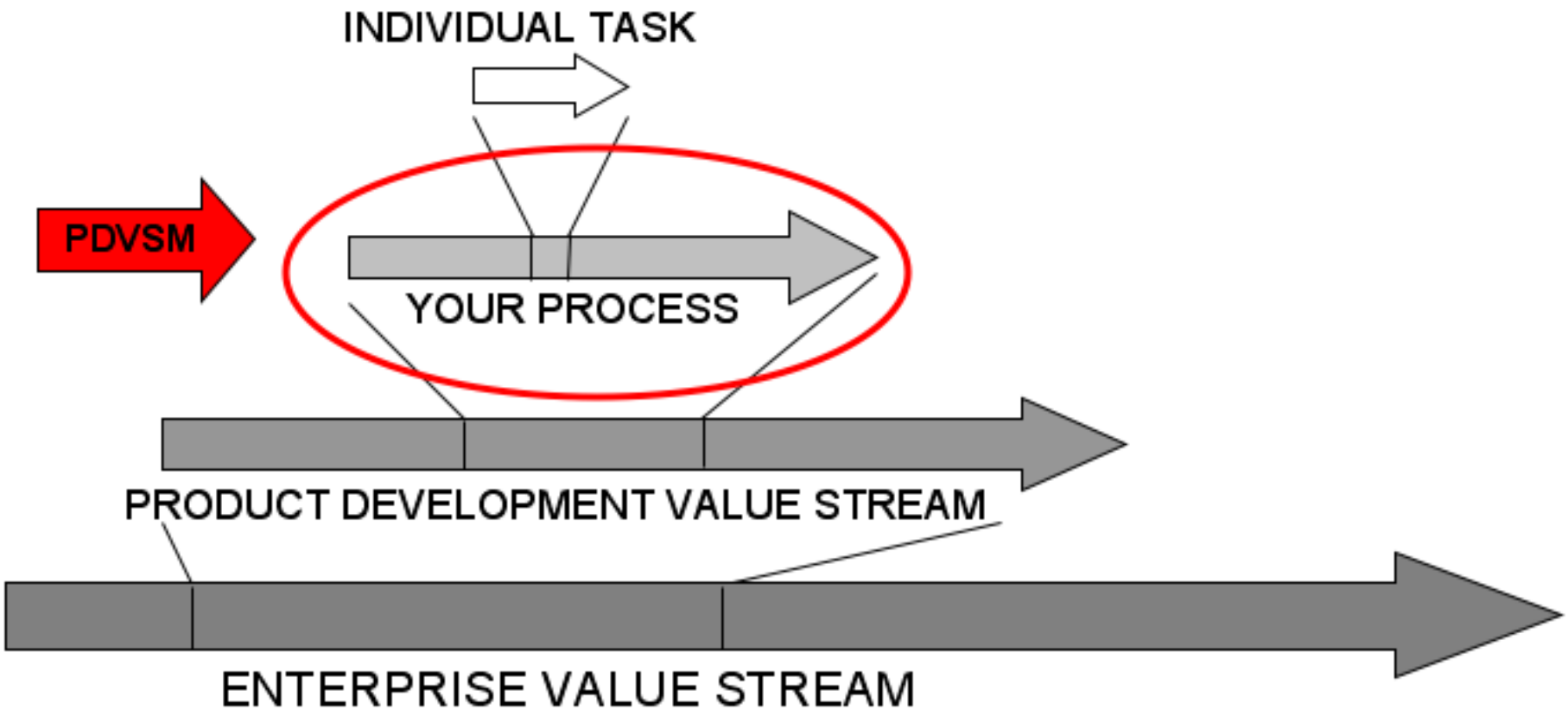
- Jim Chase
- David Slack
- Joshua Bernstein

- LAI Faculty and Staff
- LAI PD contributors

Practical Guide to PD Value Stream Mapping

- A "Rother and Shook" for Product Development
  - More details necessary for the complexities of PD
  - Details and background for lean experts
  - Practical advice for in-the-field use
- Repository of LAI knowledge
  - Four+ years of PD team experience
  - References and attributions
  - Not an academic product
- Member Best Practices
  - Suggested "cookbook"
  - Options and resources
  - Running examples and other aids

Focus: Door to Door PD Process

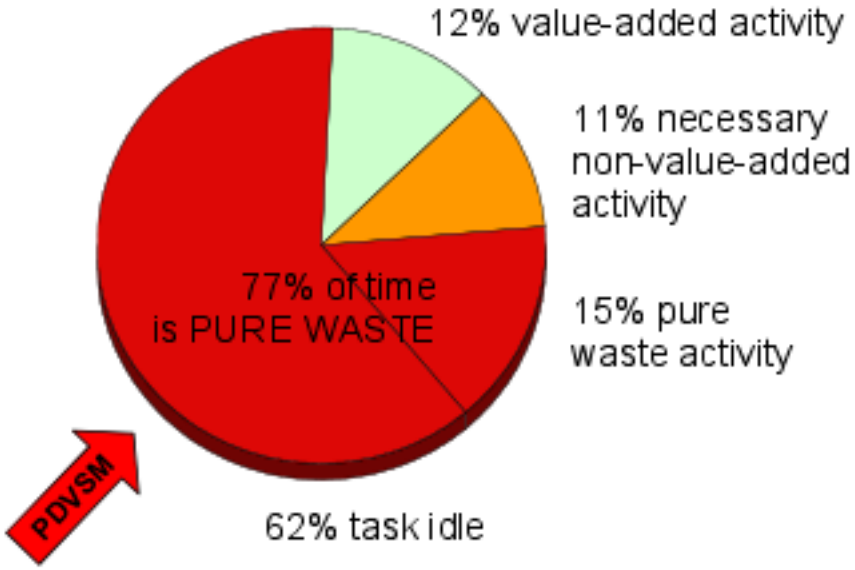


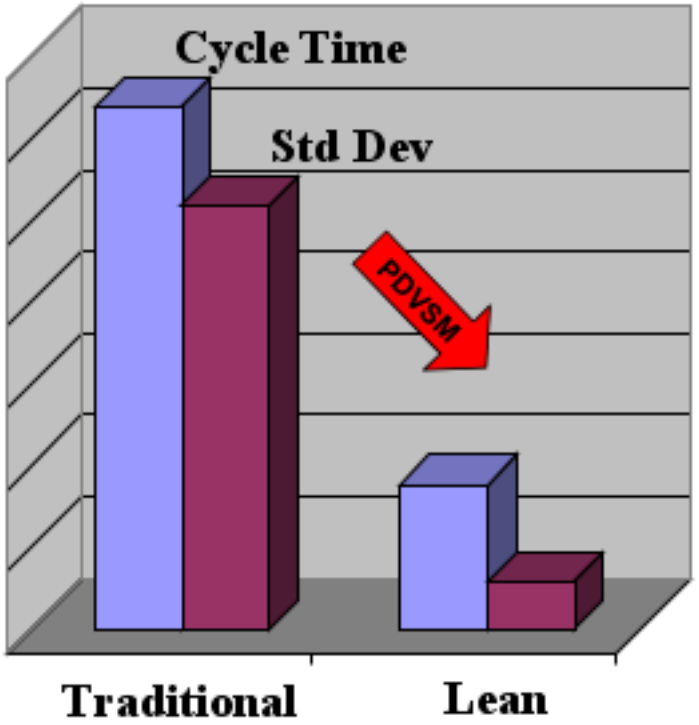
PDVSM Manual Outline

- 1.0 INTRODUCTION: LEAN ENGINEERING PROCESS IMPROVEMENT
- 2.0 GETTING STARTED
- 3.0 MAPPING THE CURRENT STATE VALUE STEAM
- 4.0 IDENTIFYING AND ELIMINATING WASTE
- 5.0 IMPROVING THE PROCESS
- 6.0 STRIVING FOR PERFECTION

- Running Example
- Metrics and other aids
- Appendices
  - APPENDIX A: METHODS AND EFFECTIVENESS
  - APPENDIX B: SAMPLE DATA COLLECTION FORM
  - APPENDIX C: SECOND EXAMPLE PDVSM
  - APPENDIX D: PDVSM CHECKLIST
  - NOTES AND REFERENCES

1.0 Motivation and Effectiveness

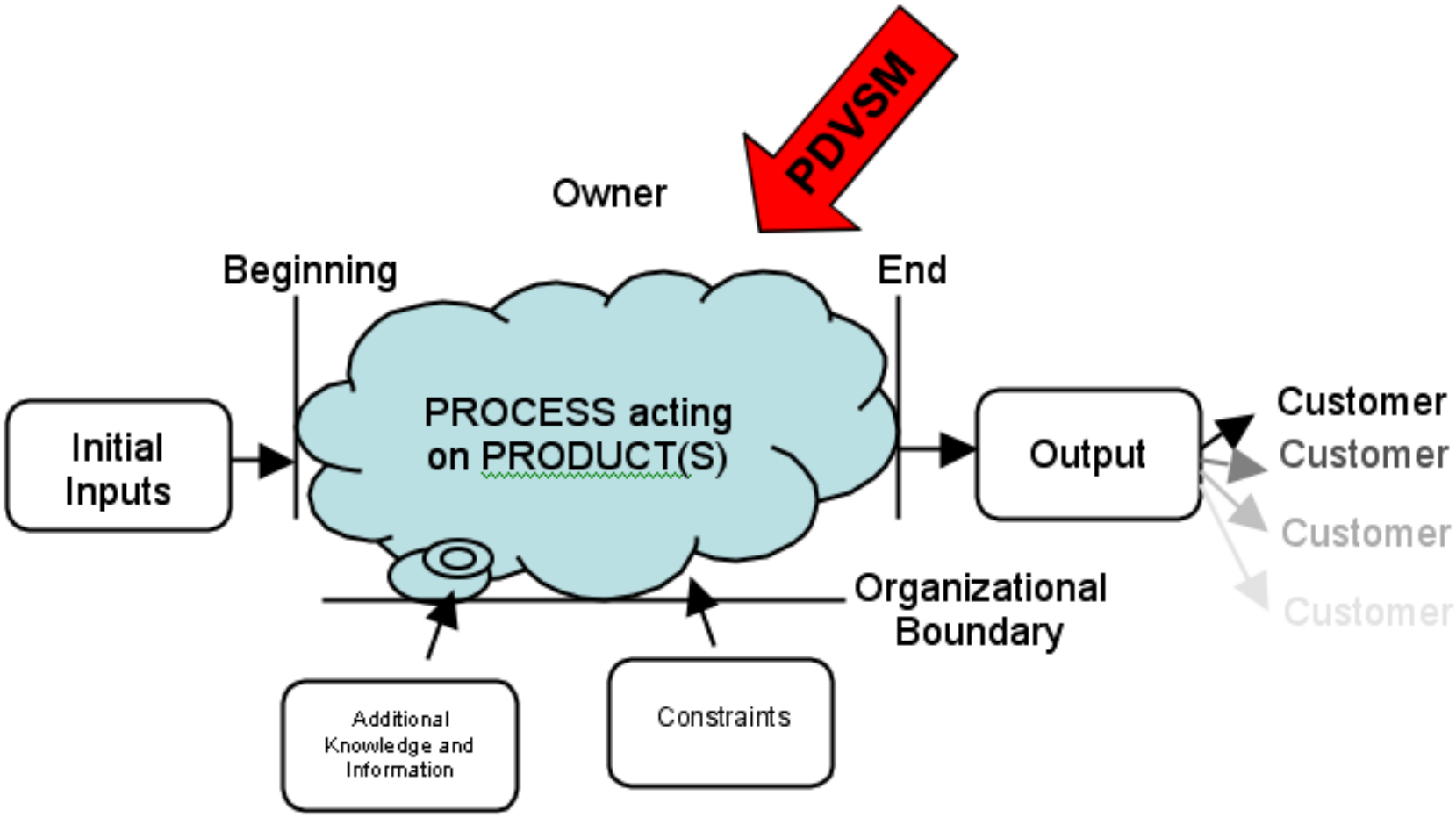




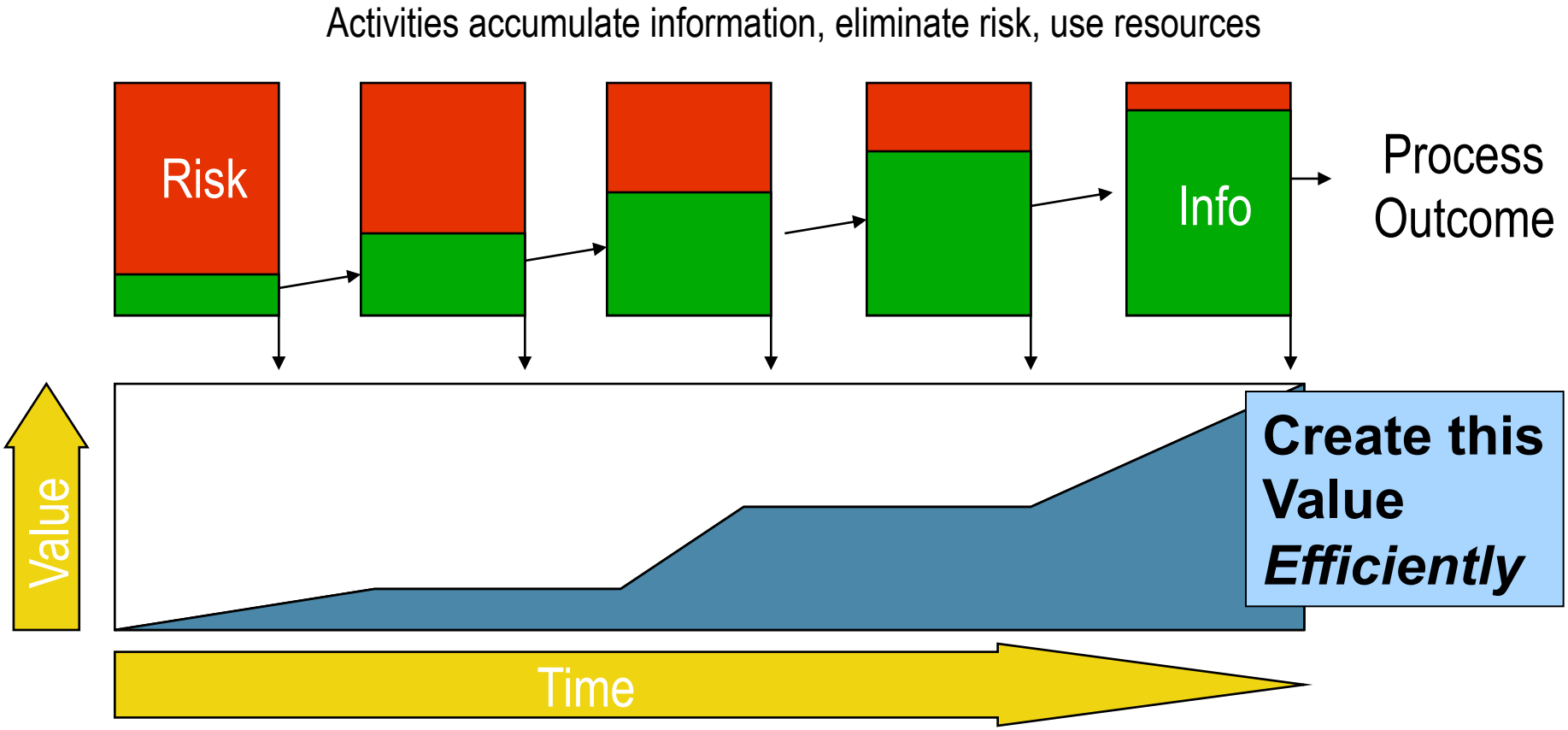
Interpreting Lean for Engineering

	Manufacturing	Engineering
Define Value	Visible at each step, defined goal	Harder to see, emergent goals
Identify Value Stream	Parts and material	Information & knowledge
Make process flow	Iterations are waste	Iterations often beneficial
Customer pull	Driven by Takt time	Driven by needs of enterprise
Perfection	Process repeatable without errors	Process enables innovation and cuts cycle time

2.0 Establishing Bounds and Interfaces



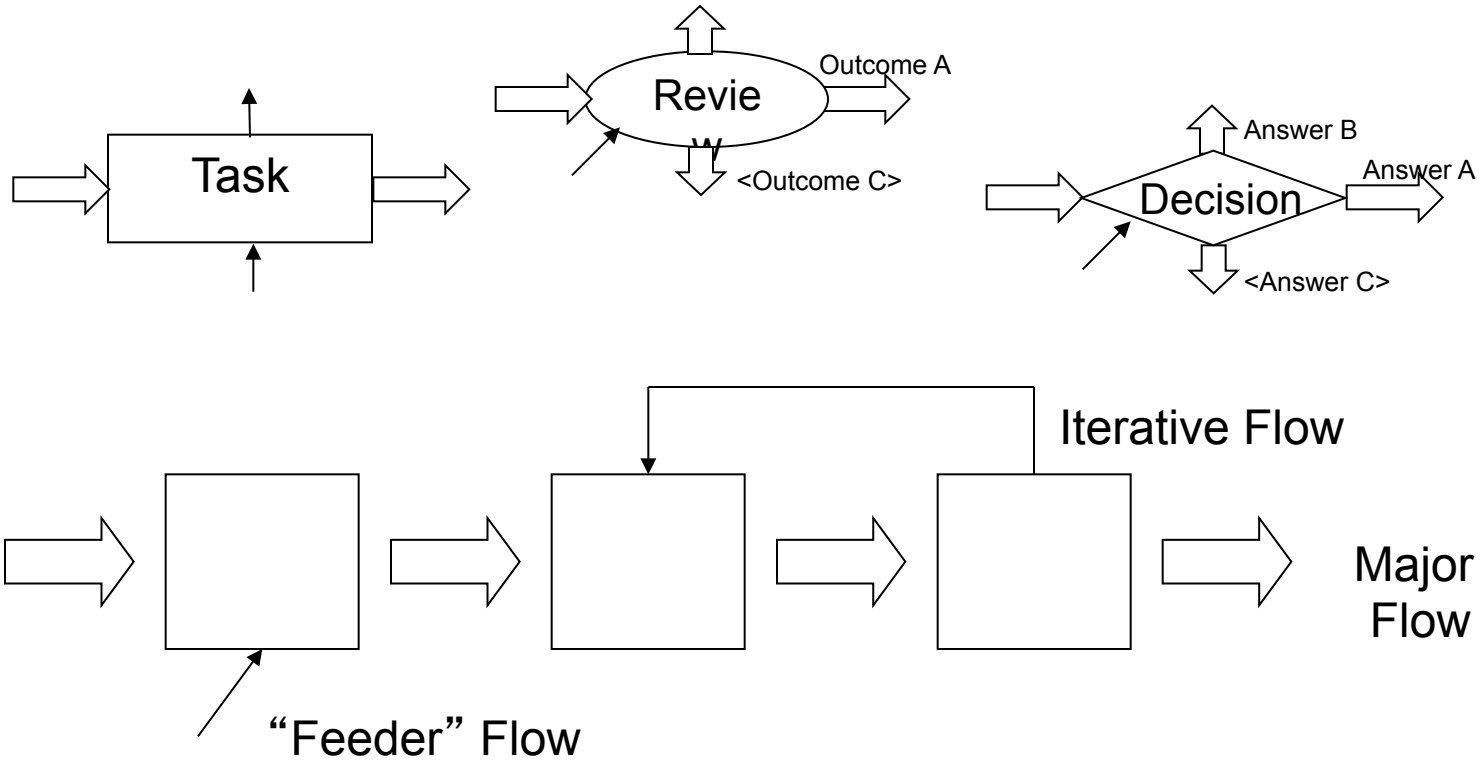
Local Value Emphasis



Adapted From Chase, "Value Creation in the Product Development Process", 2001.

3.0 Mapping the Current State

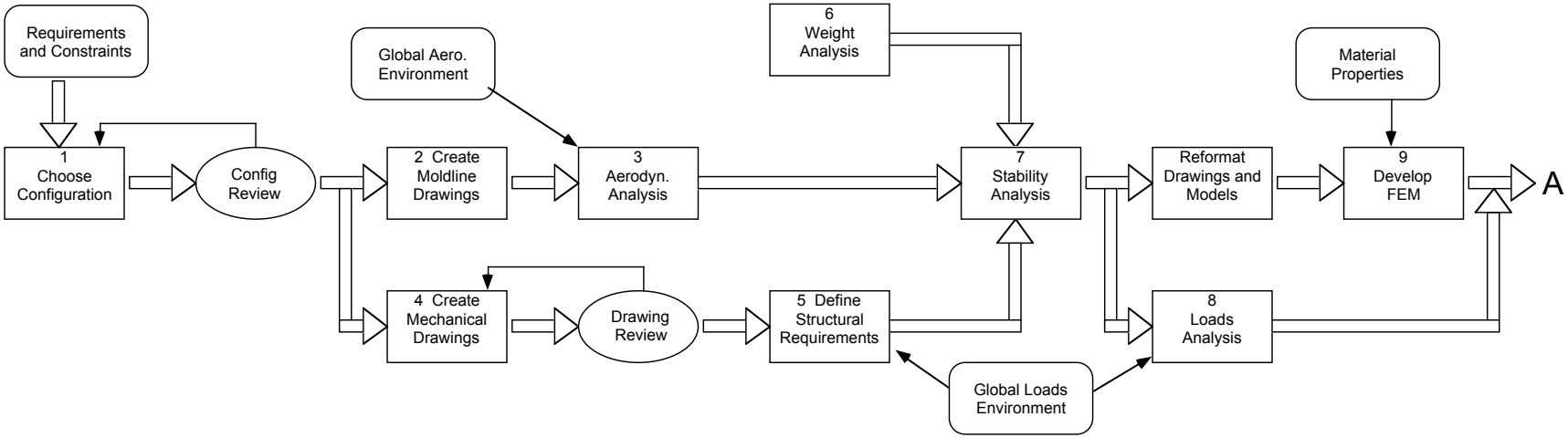
- **Mapping Information Flows**
- **Process Mapping Symbols**

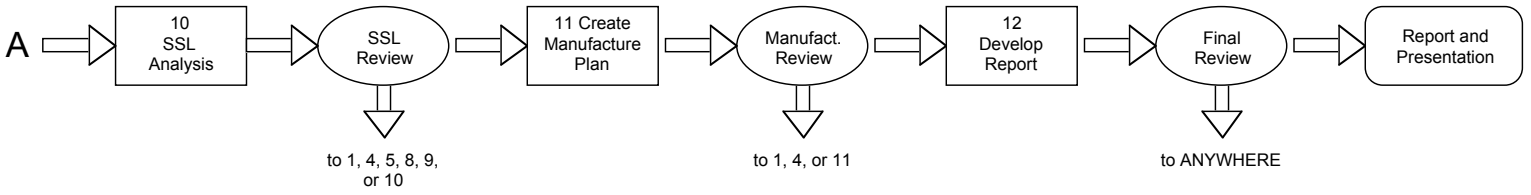


Mapping Best Practices

- Follow the Work
- Collect the Information Yourself
- Exploit Existing Process Information, Yourself
- Map “In Pencil”
- Map the Whole Value Stream

Example Value Steam: Aero-Mechanical Prelim. Design





Including Process Data: Best Practices

- Concentrate on what you need
- Exploit what you can find
- Make do with what you have
- Be honest
- Dig deep (only) when you must

Process Data Metrics

METRICS

Some of the many possible metrics for tasks:

- Cycle time (CT): clock or calendar time it takes to do an instance of the task
- In Process time (IPT): hours of continuous work it take to do the task
- Core Process time (CPT): hours of continuous work spent on core task (excluding set up, trouble shooting, information gathering, etc. Sometimes called Value Added time (VAT)
- Efficiencies such as IPT/CT, CPT/CT or CPT/IPT
- Lead time: time from known need for task until task completion
- Set up or Changeover time: time needed to prepare resources to do or resume task
- Fixed or non-recurring costs (what resources must exist for the task to take place, even if they are not used continuously)
- Cost/job or recurring costs (what resources are expended to do a job)
- Availability: % time resources are actually available when needed
- Variation in any of the above (how predictable is the process)
- Rework rate (incident of defects)
- Downstream task satisfaction (how good is the task output)

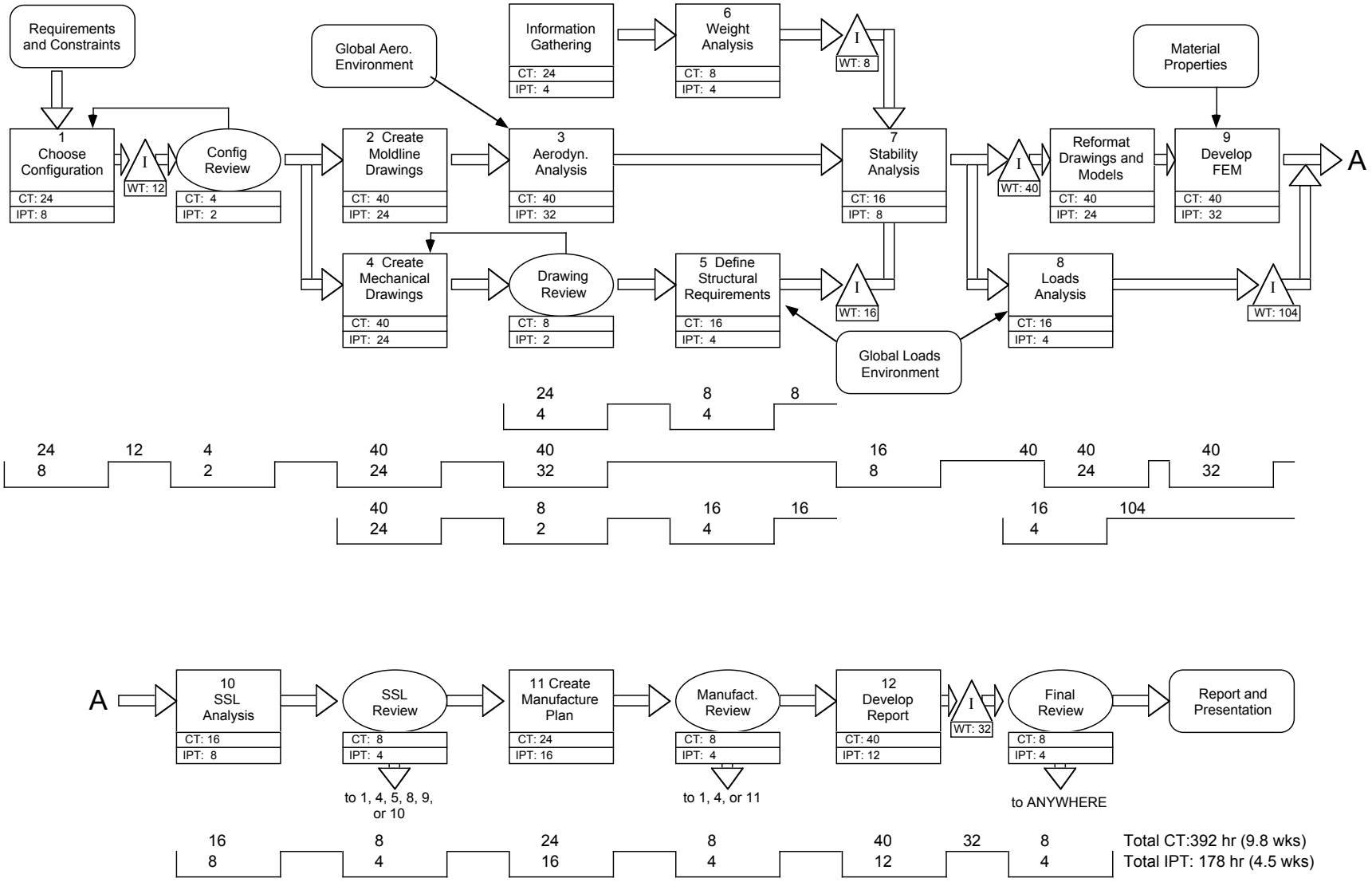
Waiting and Inventories can be measured by:

- Inventory part count: number of jobs in queue (usual factory metric)
- Delay time: average time a single job waits in queue (typically more useful in PD)
- Delay time statistics: mean and deviation, or distribution, of wait times (best)

Data can also be collected on the information flows, e.g.:

- Form: report, computer file (what system?), email, phone call, etc.
- Format: standard form? Software specific computer file?
- Size (of file or document)
- Transmission times and/or costs

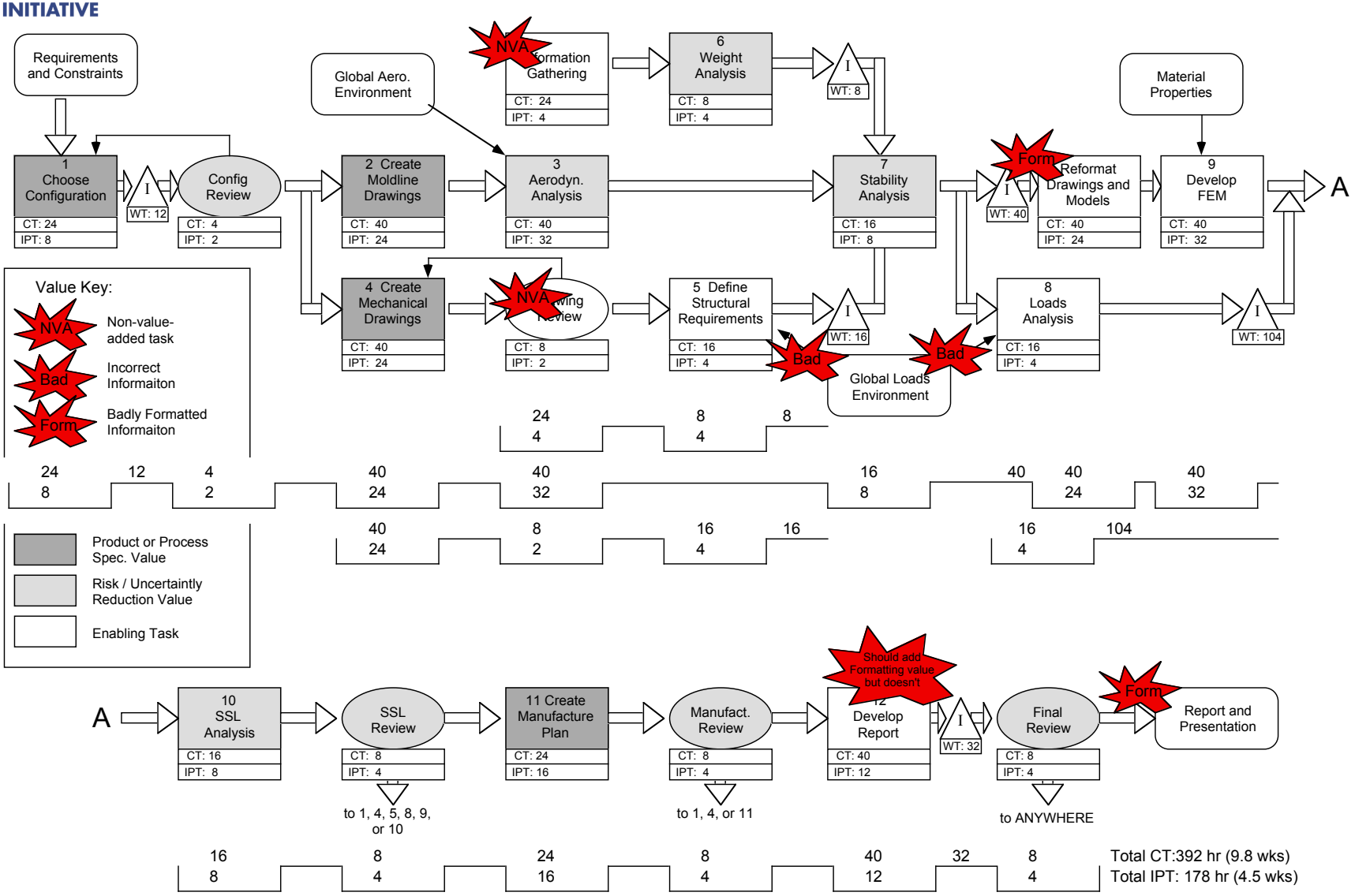
Example with Metrics and Timelines



Value Assessment

- Identify NVA tasks
- Identify (and verify) *types* of value creation, e.g:
  - V1. Definition of End Product with desired Functional Performance
  - V2. Definition of Processes to Deliver Product
  - V3. Reduction of Risks and Uncertainties
  - V4. Form of Final Output – to be compatible with downstream processes
- Identify NVA information flows

Example with Value Assessments



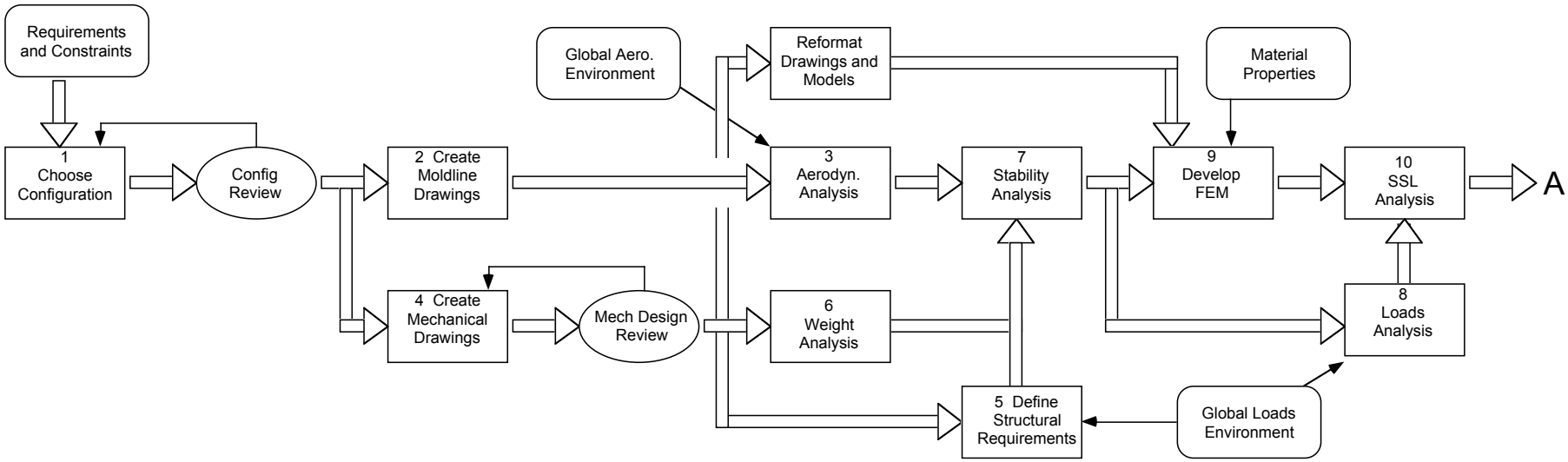
4.0 The Seven Info-Wastes

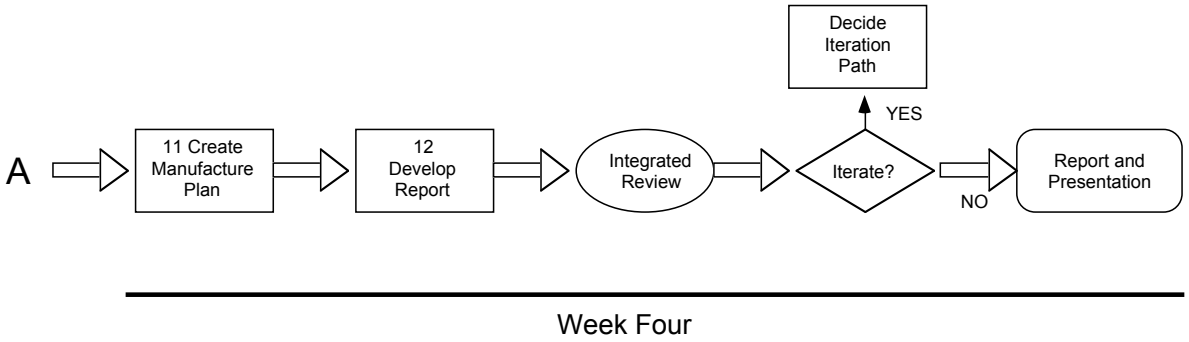
1. Over-production	Creation of unnecessary data and information; Information over-dissemination; Pushing, not pulling, data
2. Inventory	Lack of control; Too much in information; Complicated retrieval; Outdated, obsolete information
3.Transportation	Information incompatibility; Software incompatibility; Communications failure; Security issues
4. Unnecessary Movement	Lack of direct access;Reformatting
5. Waiting	Late delivery of information; Delivery too early (leads to rework)
6. Defective Products	Haste; Lack of reviews, tests, verifications; Need for information or knowledge,data delivered
7. Processing	Unnecessary serial production; Excessive/custom formatting; Too many iterations

Eliminating Waste - Best Practices

- **Eliminating Time Waste**
  - Clear external constraints
  - Assure the availability of information
  - Establish a Takt time
- **Eliminating Non-Value-Added Tasks**
  - Monuments
  - Unnecessary Documents and Formatting
  - Unnecessary or Underutilized Analyses
  - Unnecessary or Inefficient Reviews and Approvals
  - Unnecessary Motion

Future State Example



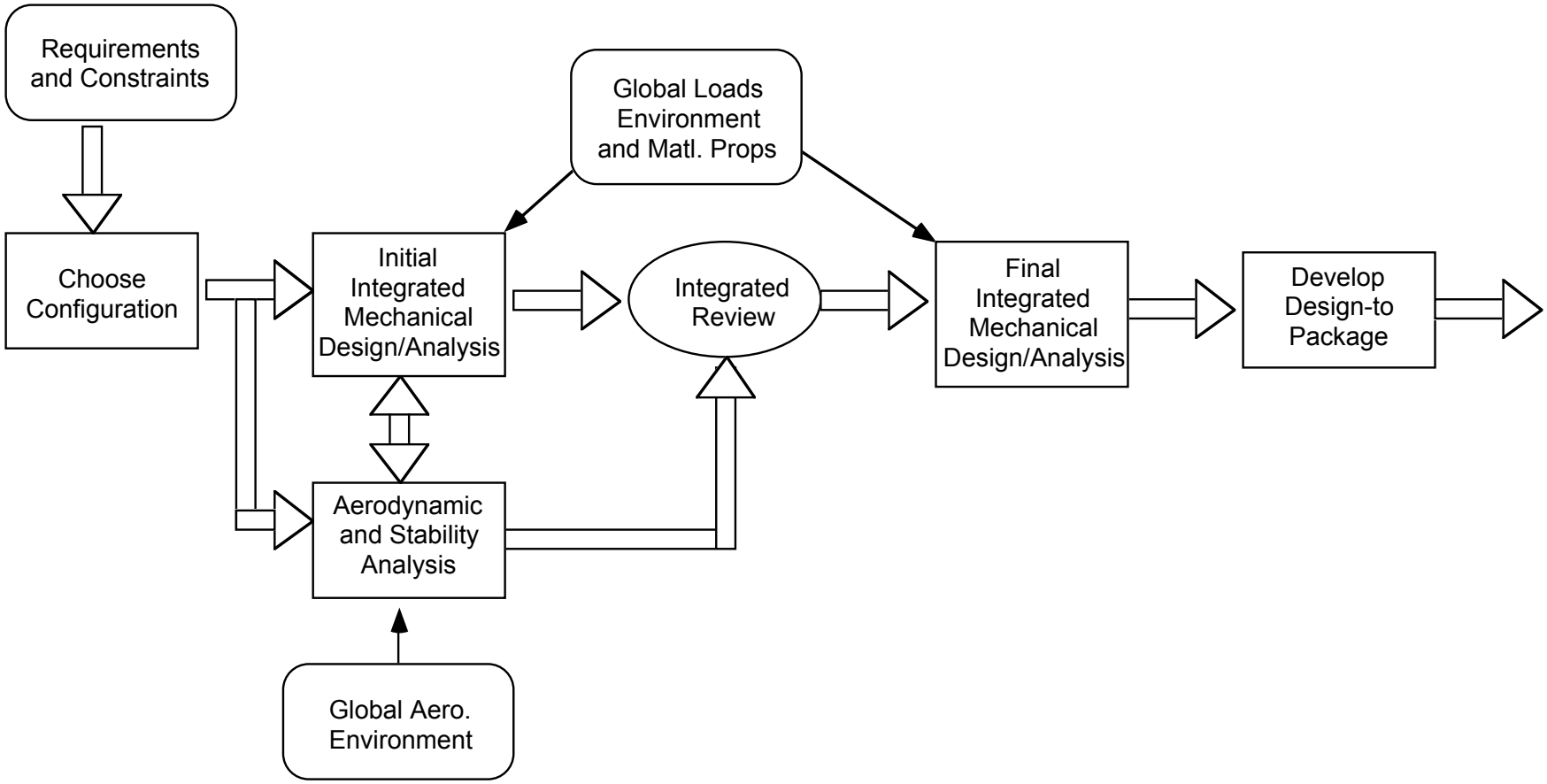


5.0 Improvement Hueristics

- The LEM
- Millard's Value Stream Analysis Hueristics
- Collocation, boundary objects, and shared experiences
- A few good books
- Some radical ideas

Ideas to help you improve your situation

Ideal State Example



Plan for PDVSM Manual

- **Today:** Alpha Release
  Early Reviewer Lunch
- **Soon:** Reviewer Feedback
- **Now-April:** Identify test sites
- **May-June:** Alpha Tests
- **July:** Revisions
- **August:** 1.0 Product Release

