

A Comparison of BPMN 2.0 with Other Notations for Manufacturing Processes

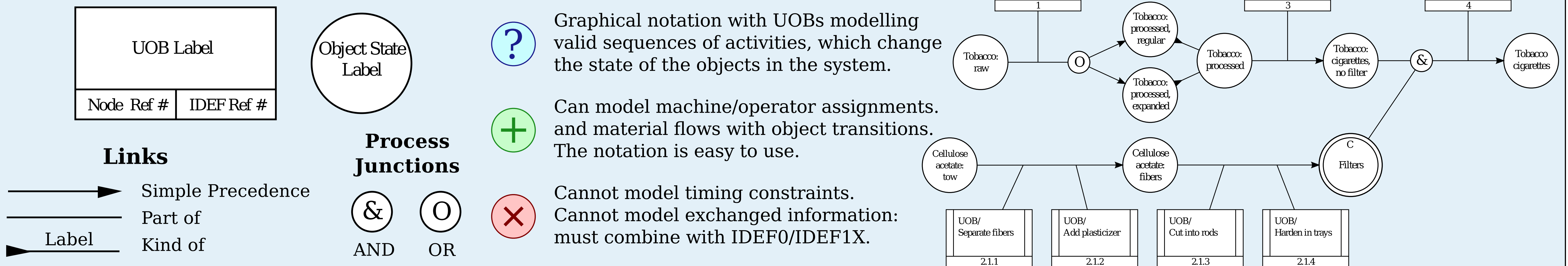
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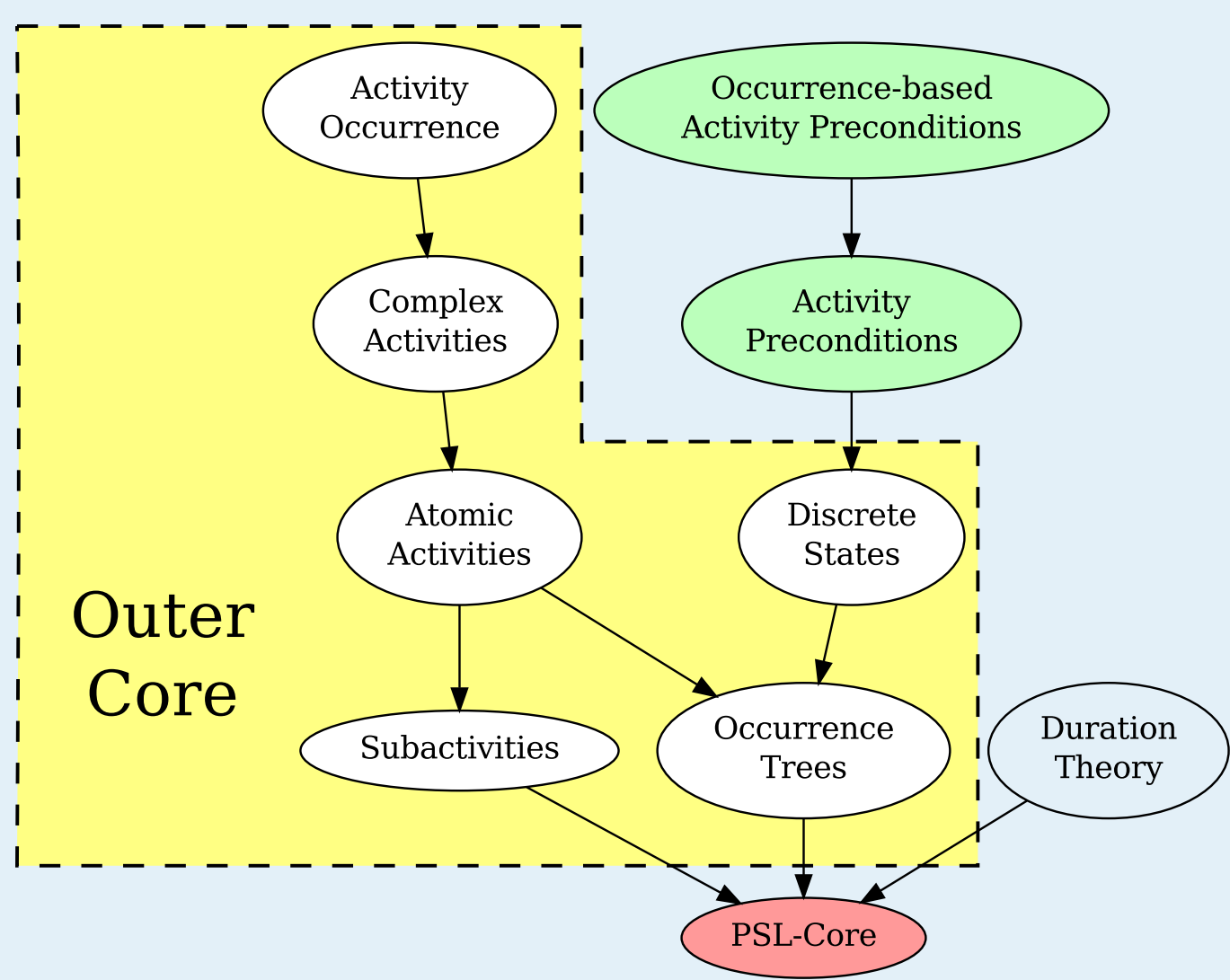
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BPMN 2.0 is being heavily adopted for automating information-centric business processes. Is it better than existing notations for processes in a Distributed Manufacturing System?

IDEF3



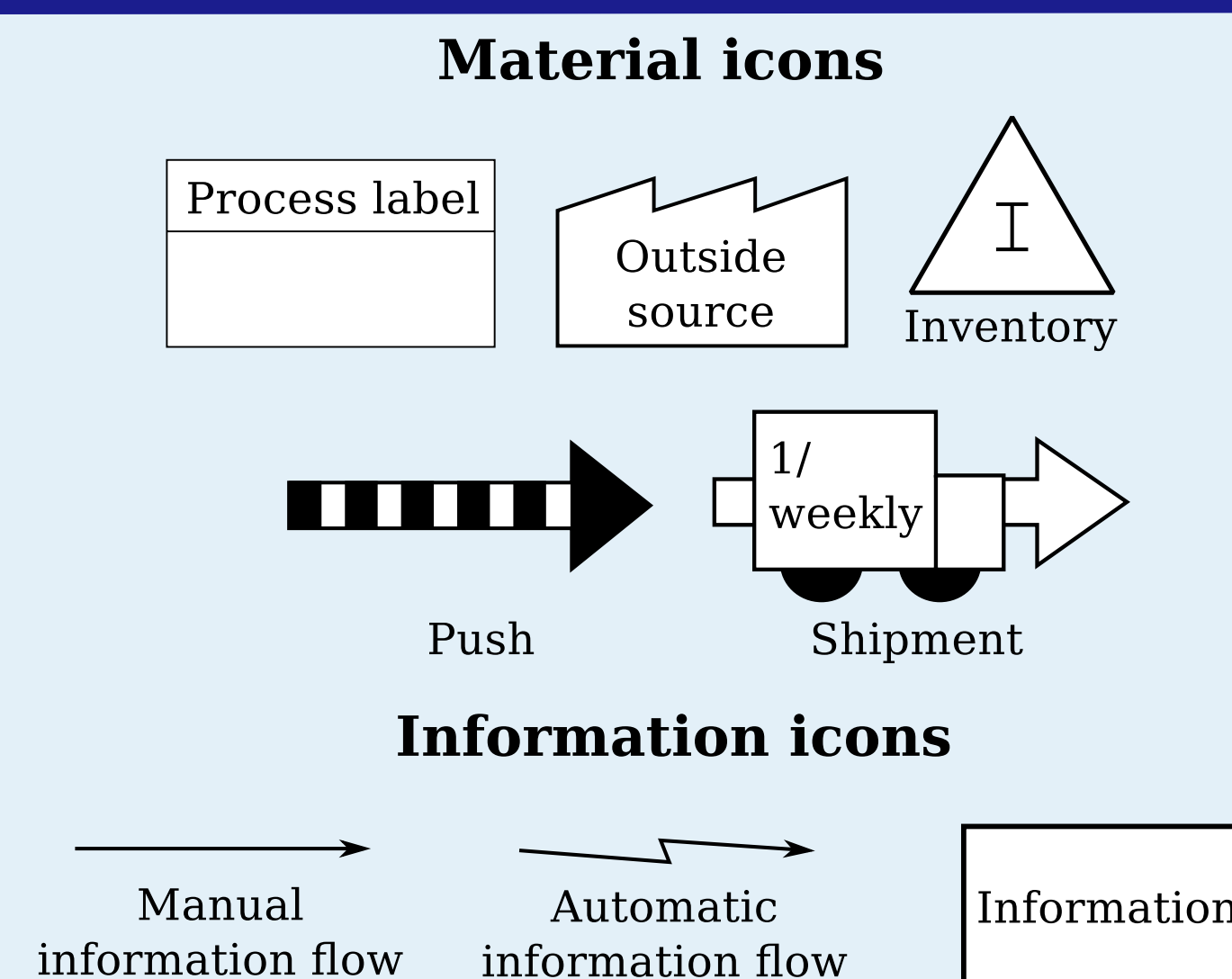
PSL (ISO 18629:2004)



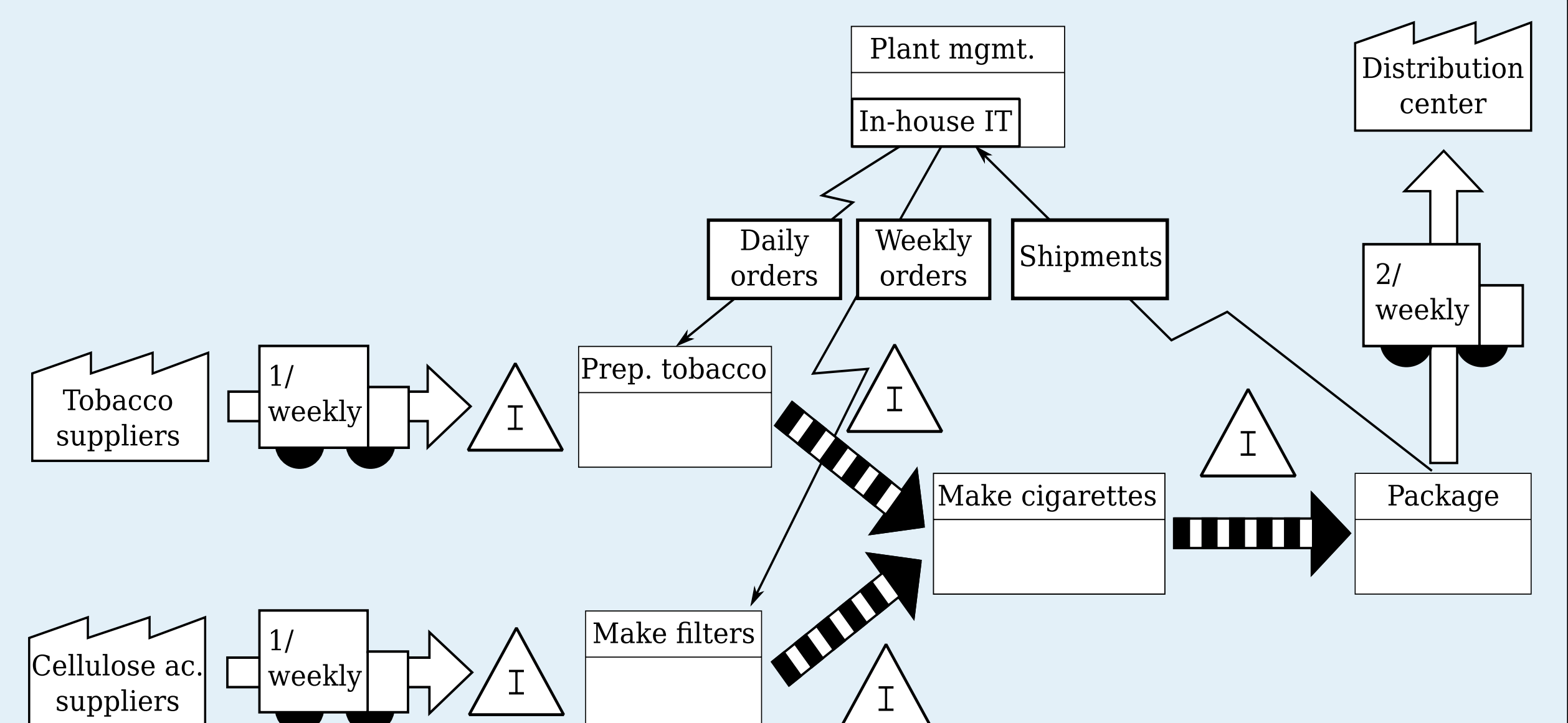
- Textual formal specifications based on a KIF-based ontology. The ontology is divided into modules.
- Conceptually rich and very powerful: can model families of processes using general activity ordering constraints.
- Textual notation is hard to learn and use. Does not model information flows yet. Poor support by tools.

```
(forall (?opt)
  (implies (oof ?opt PreprocessTobacco)
    (exists (?oim ?oac ?orc ?ob ?orb ?ocut ?ocomp)
      (and (oof ?oim IncreaseMoisture) (oof ?oac AddCasings)
        (oof ?orc RefillCasings) (oof ?ob Blend)
        (oof ?orb RefillBlender) (oof ?ocut Cut) (oof ?ocomp Compress)
        (sao ?oim ?opt) (sao ?oac ?opt) (sao ?orc ?opt) (sao ?ob ?opt)
        (sao ?orb ?opt) (sao ?ocut ?opt) (sao ?ocomp ?opt)
        (mpr ?oim ?oac) (mpr ?oac ?orc) (mpr ?orc ?ob)
        (mpr ?ob ?orb) (mpr ?orb ?ocut) (mpr ?ocut ?ocomp))))))
```

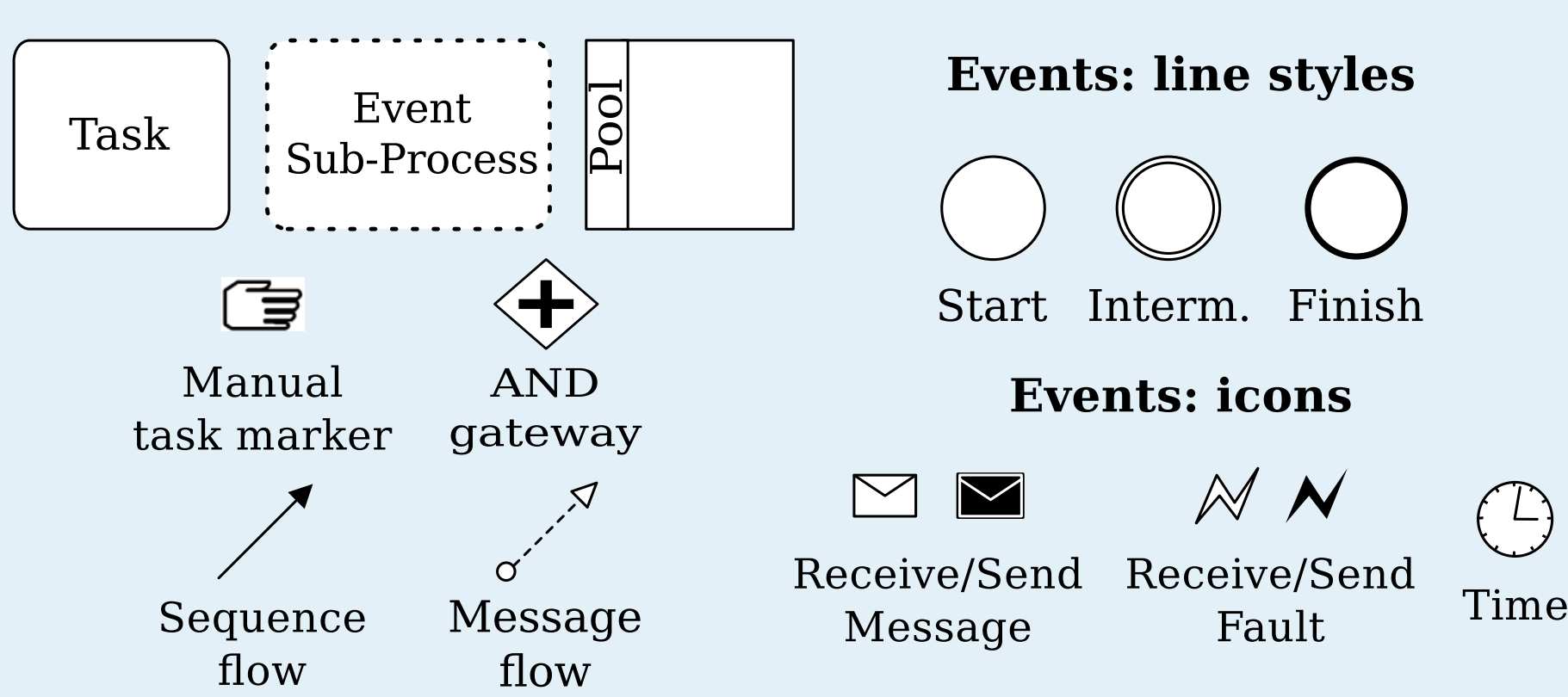
Value Stream Mapping



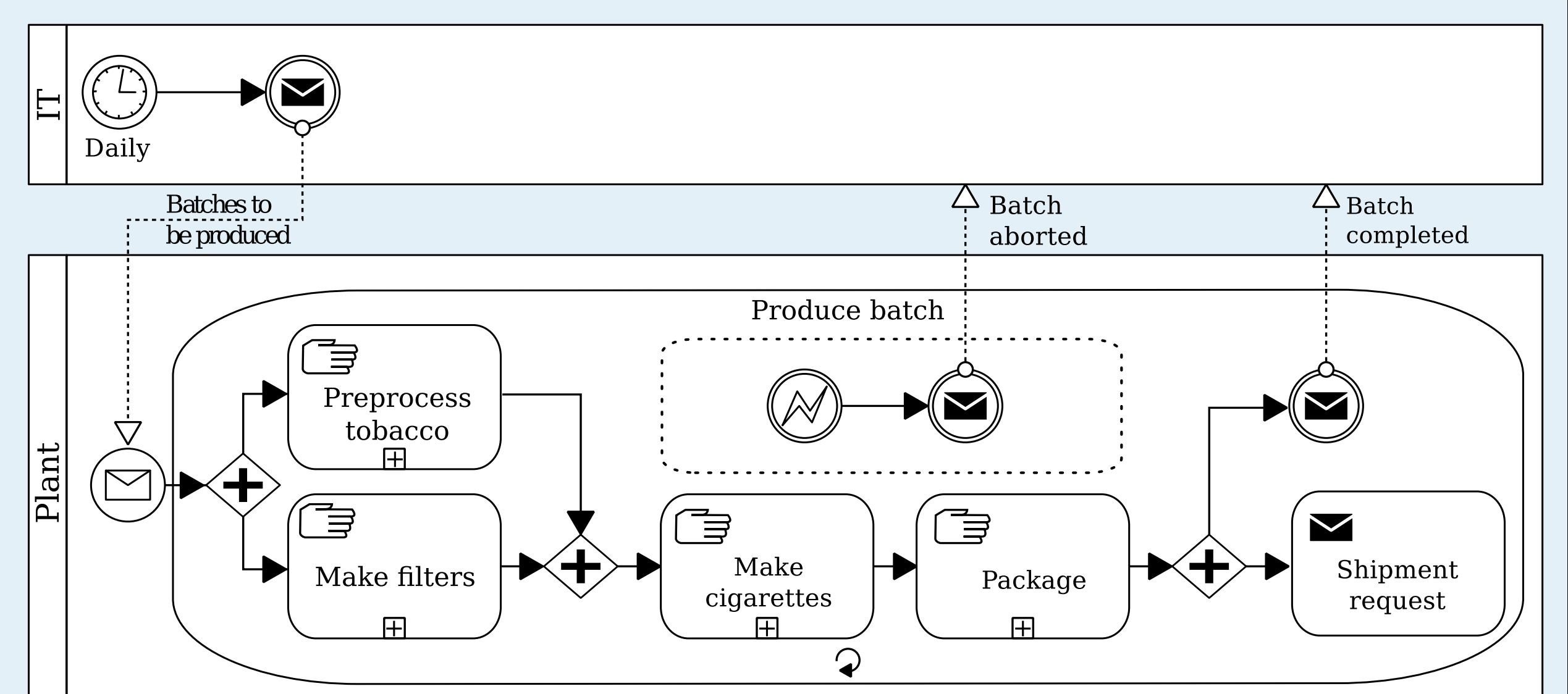
- Graphical notation which focuses on the material and information flows in a manufacturing plant.
- Pen-and-paper notation: provides quick insight on wasteful activities with little cost.
- Material and information flows are too coarse for automated process enactment or monitoring.



OMG BPMN 2.0



- Pools contains the tasks to be run by each participant. Flows indicate valid orders and exchange messages.
- Formal Petri-net execution semantics. Fine-grained information flows. Can model timing aspects and faults.
- Cannot model material flows nor object state transitions. Requires extensions for structuring information.



Summary and Conclusions

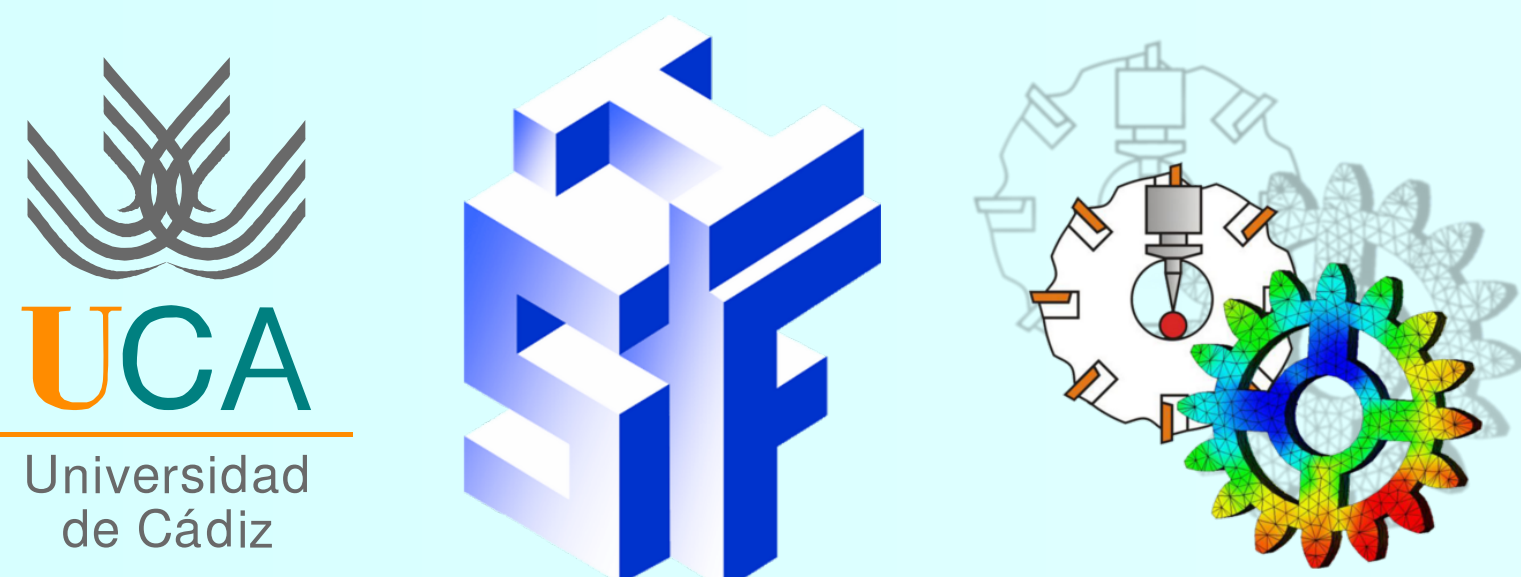
BPMN 2.0 can be seen as a superset of IDEF3, taking away its support for object transitions. BPMN 2.0 is recommended for:

- Describing information-intensive support activities.
- Repetitive manufacturing process with little variation.

For highly variable processes, PSL is the best choice, but better tools are required. VSM complements BPMN: the first is for iterative process improvement, and the latter is used for detailed process design and automated enactment and monitoring.

References

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- [2] R. J. Mayer, C. P. Menzel, M. K. Painter, P. S. de Witte, T. Blinn, and B. Perakath, IDEF3 Process Description Capture Method Report. Texas, USA: Knowledge Based Systems Inc., 1995, p. 236.
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