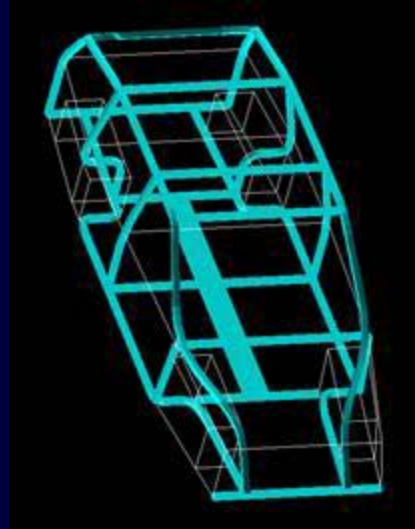
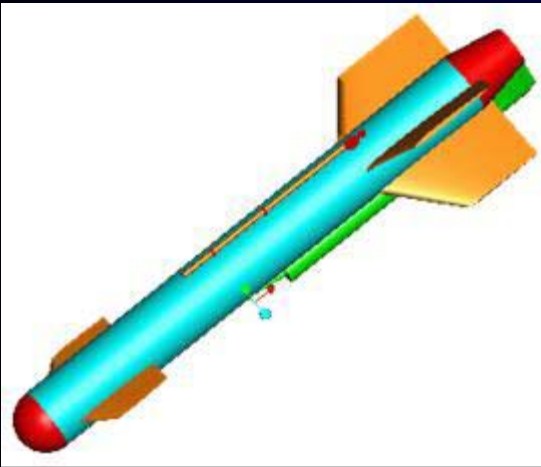


# Activity Based Operation Modeling and Events Simulation



# TechnoSoft the Company

TechnoSoft Inc., founded in 1992, is a leading provider of object-oriented Modeling software for Knowledge-Based Engineering.

The Adaptive Modeling Language, AML, is the foundation of many commercial and defense Knowledge-Based Engineering applications.

In partnership with major aerospace industry and US government research labs TechnoSoft has developed and deployed key engineering solutions for technology assessment and evaluation.

# Activity Based Operation Modeling

Support the modeling of the operations and activities of the engineering processes at each level of the product life cycle: Design, Production, Deployment, and Maintenance.

## Technology Assessment

Assess the impact of the technology variables on the product processes and related cost employing:

- Product Data Model (Geometry, Material, Process)
- Producibility Knowledge Base
- Process Data Base (Tooling and Equipment standards)
- Resources and material Manager

# Process Modeling Methods and Elements

A unified object-oriented part model representing a common computational model enabling the direct exchange and link of part geometry/data and Process Elements.

Model the process operations sequence, resources, and material requirements facilitating assessment of technology variables impact on operation time, span time, and cost.

Provide a web-based collaborative environment supporting the real time interaction among the various participants

Facilitate the representing of the process various element for operations sequencing optimization accounting for resources constraints and interdependencies.

# Process Domain Definition

Support the defining of custom domain-specific process element templates, called meta-processes or process catalogs. Basic elements are Operations, Resources, Material, and Components.

Labor categories, machines, facility resources, etc, can be defined based on the general element provided. Attributes and relationships can be dynamically added and defined.

The tailored elements can be used to build dynamic parametric process model. These meta-processes can then be saved to a file and used in future process models.

# Benefits

- Support standard representation and documentation of processes activities and operations.
- Facilitate sharing of process knowledge among disciplines, as well as among partnering organizations and contractors.
- Facilitate technology assessment and cost feasibility early in the design stage.
- Trace cost variance with design releases.
- Account for cost at each level of the model hierarchy and across processes.

# Framework Adoption

Provide the tool to supplier as stand alone applications or provide access via the internet.

Enable the supplier to characterize their production process via providing their production operation model and resources.

Enable the exchange of dynamic operation models without jeopardizing any of the supplier proprietary information.

# Applications

Cost Estimation

Time and Schedule Estimation

Resource Management

Stock Management

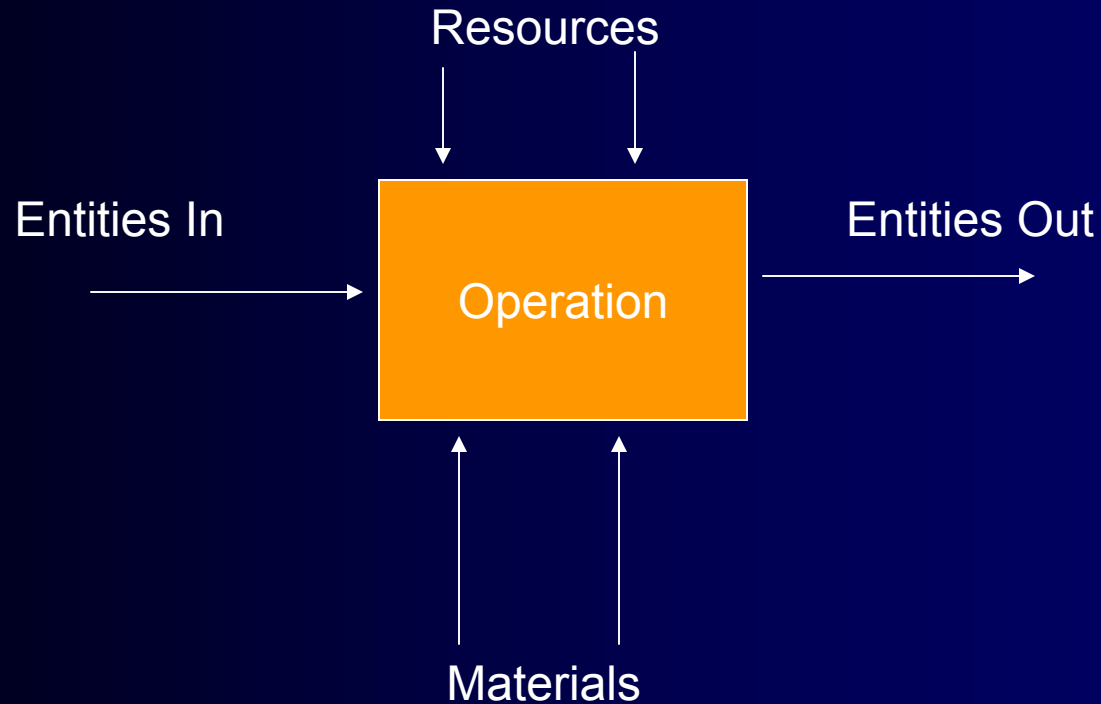
Progress Tracking

Process Planning and Simulation

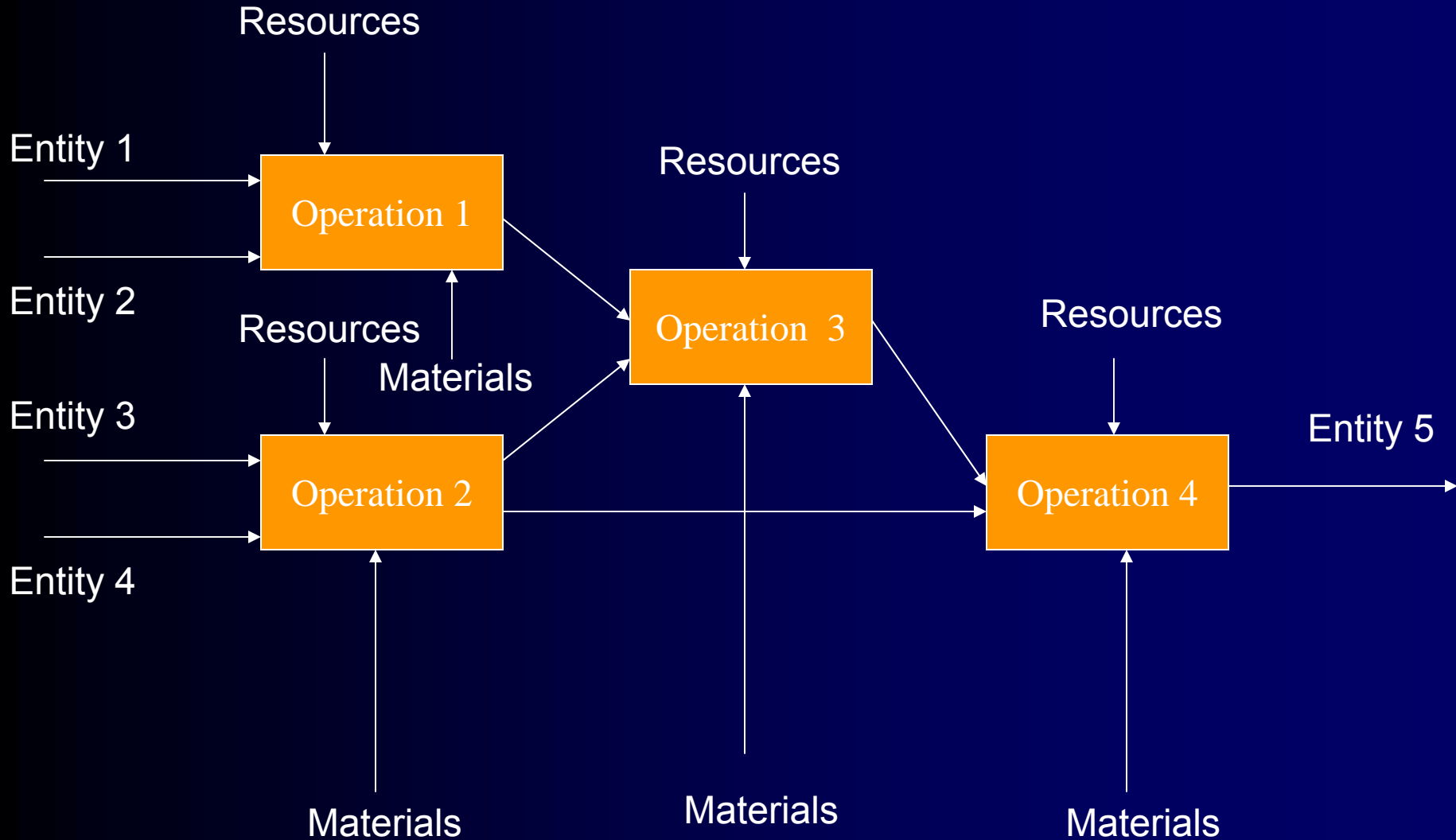
Process Visualization

Discrete Event Simulation

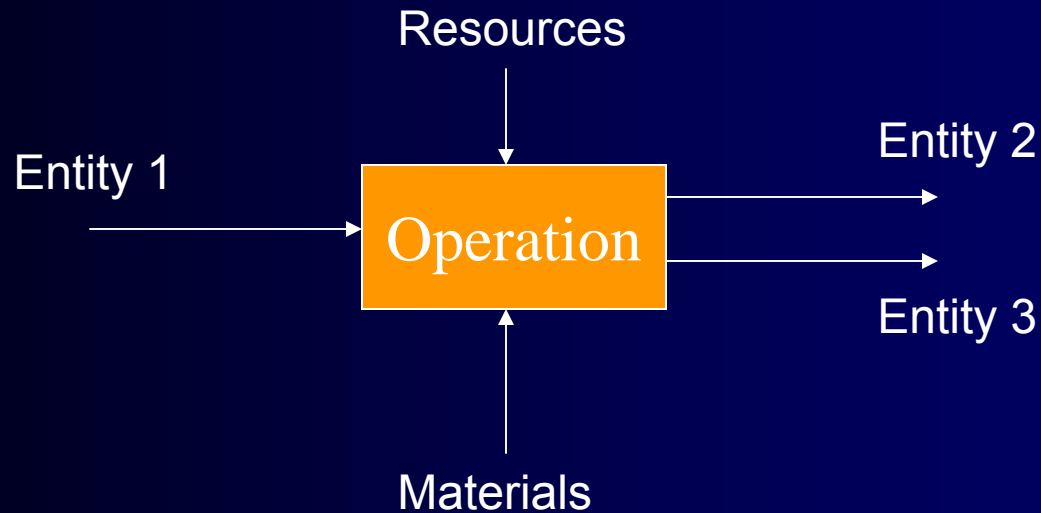
# Process Elements Abstraction



# Process Elements Abstraction (cont)



# Process Elements Abstraction (cont)



# Process Elements Abstraction (cont)

## Operations

### *Attributes*

Duration

Start Time

End Time

Cost

Resources, Materials, Input & Output Components

Predecessors

## Components

Subjects that the Operation act on, or add value to.

### *Attributes*

Cost

# Process Elements Abstraction (cont)

## Resources

Finite resources such as labor, machinery, facilities, etc.

*Attributes:*

- Available Quantity
- Cost Rate

## Material

Perishables such as fuel, stock, supplies, etc. *Attributes:*

- Available Quantity
- Cost Per Unit

## Event

An event that is external to the physical operations and statistically related such as weather or damage

*Attributes:*

- Frequency
- Cause
- Effect

# Cost Accumulation

$$\text{Process Cost} = \sum (\text{Activities Cost})$$

$$\text{Activity Cost} = \sum (\text{Resources Cost}) + \sum (\text{Materials Cost})$$

$$\text{Resource Cost} = (\text{Resource Cost Rate}) * (\text{Activity Duration})$$

$$\text{Material Cost} = (\text{Material Cost Per Unit}) * (\text{Units Consumed by Activity})$$

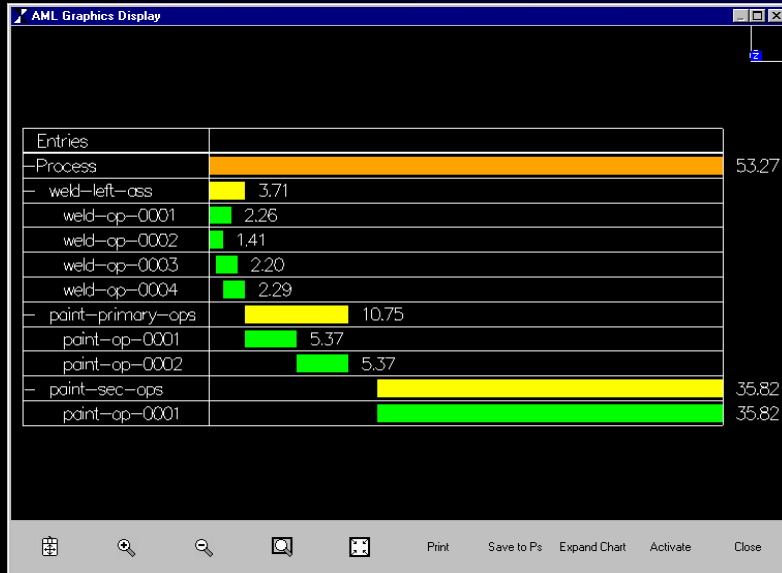
# Process Operations Schedule

$$\text{Process Span} = \text{MAX (Activity End Time)} \\ - \text{MIN (Activities Start Time)}$$

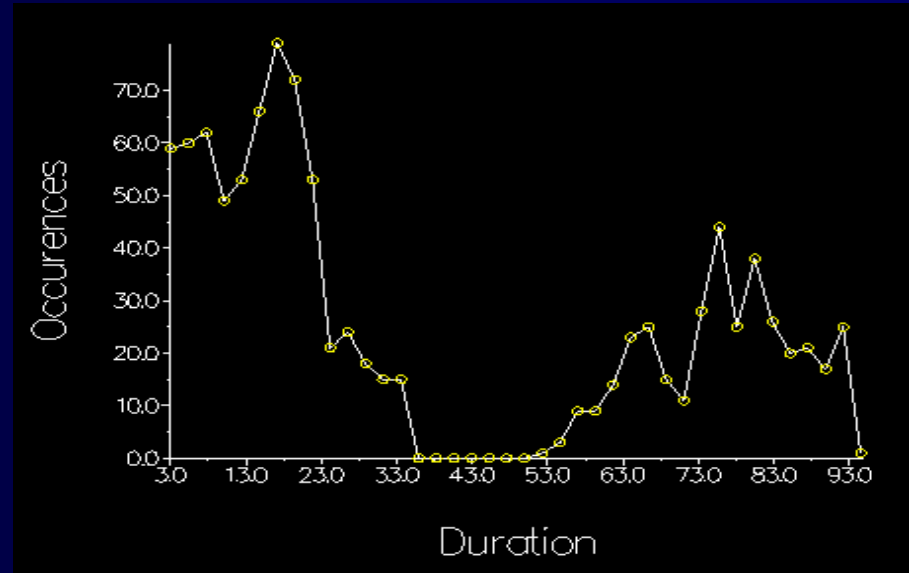
Activities are scheduled based on the 'Predecessor' relationships between activities.

Scheduling will take into account Resources and Entities.

# Post Processing

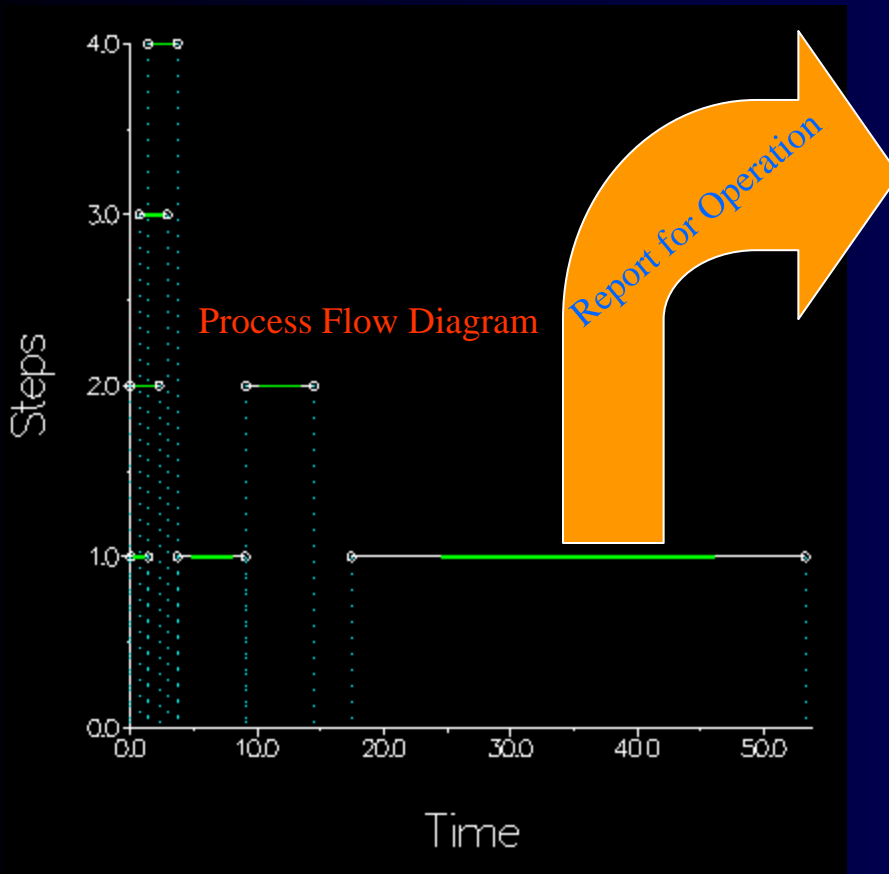


Gantt Chart



Random Variable Distribution

# Reports



Resource Report		
Paint-Op-0001		
Start Time [Sec]	17.4518	
End Time [Sec]	53.2685	
Resource	Name	Qty
1	Paint-Machine-0001	1.0000
2	Paint-Labor-2-0001	1.0000