Project „Flexible Assembly Processes for the Car of the Third Millennium (MyCar)“

Methodology Description (High Level)

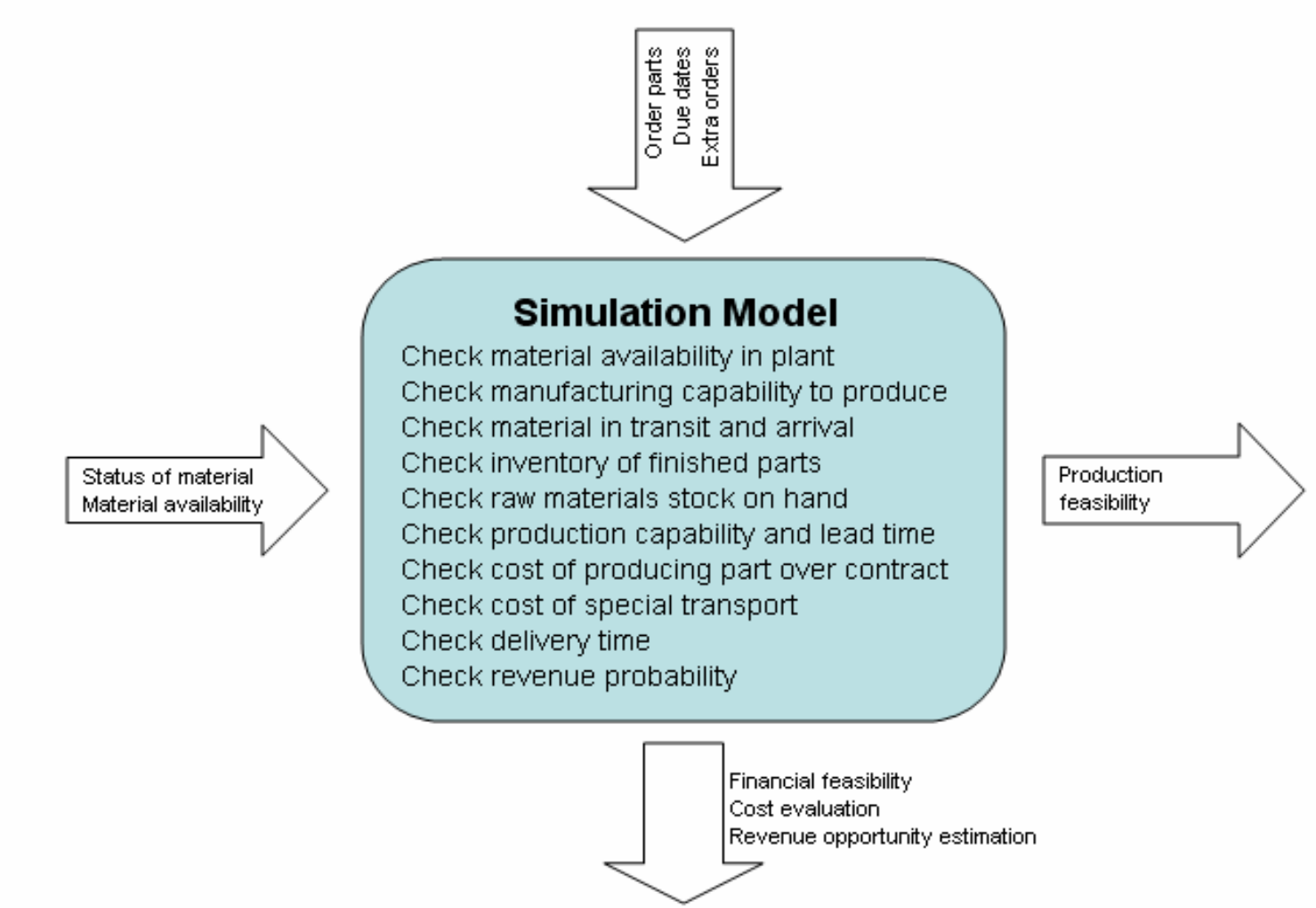
Supply Chain Simulation Software

CASP

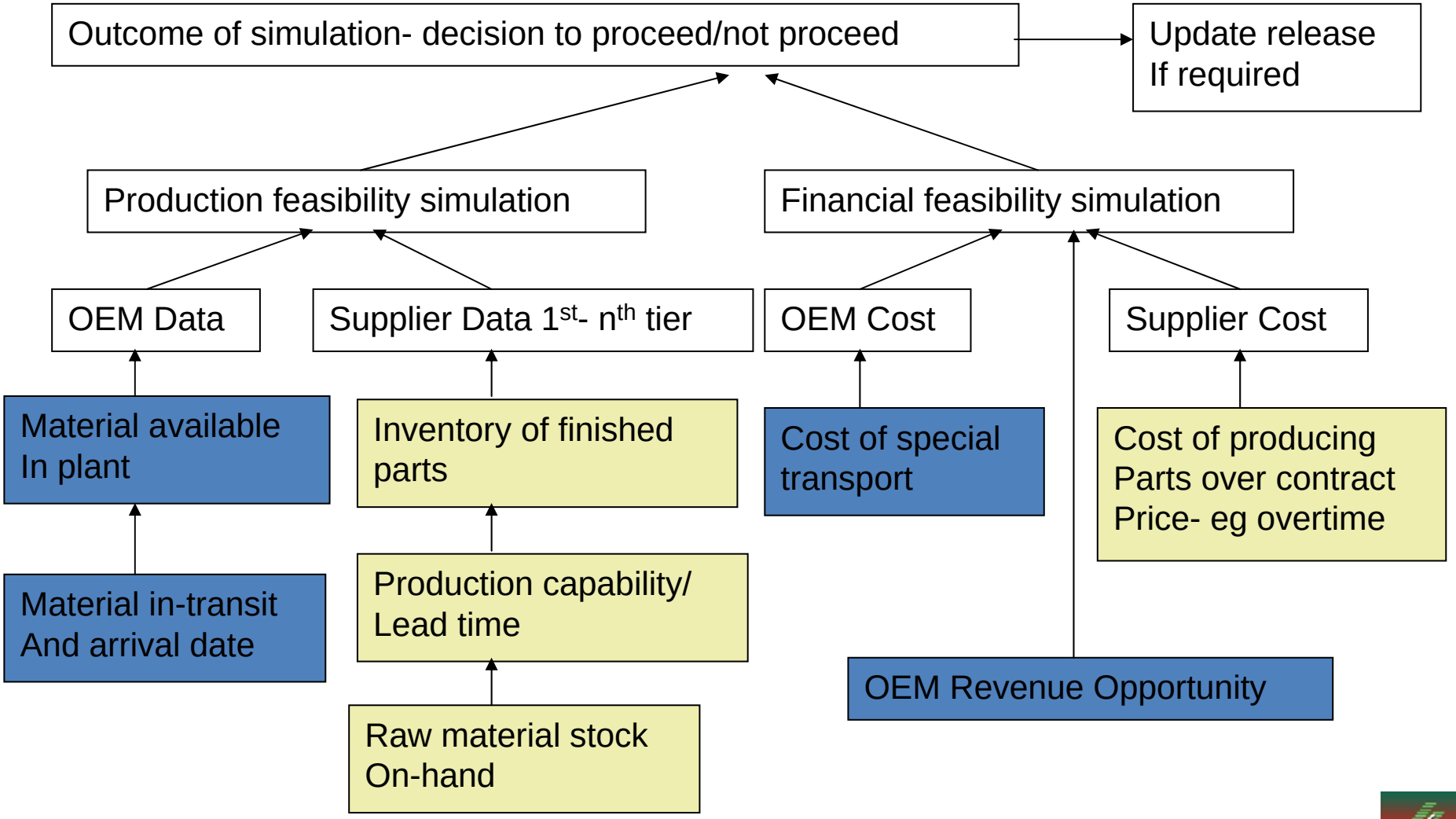
Methodology Description

Internet based supply chain control logic that dynamically queries supply chain partners to provide near real time information regarding the availability of parts and costs required for the production of highly customizable products.
Considers the likelihood for a customer to accept a potential delivery date and evaluates several alternatives.

Concept of The Simulation Model



High Level Data Requirements



Basic logic

- ***Time Constraints and Financial Feasibility Checking***

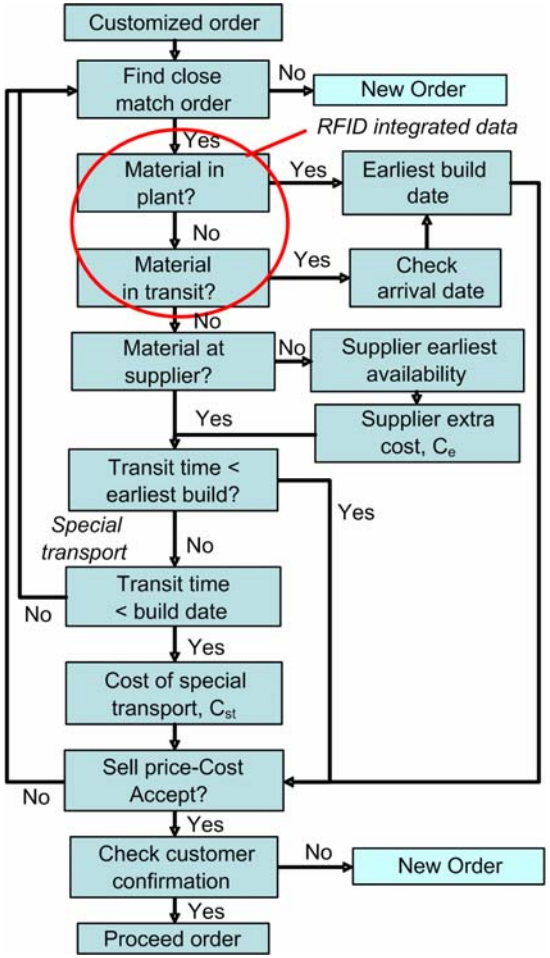
IF Part in OEM Inventory or in Transit THEN No Extra COST

IF Part in Supplier Inventory THEN Extra COST for Special Transport:

$$C_{extra} = C_{st}$$

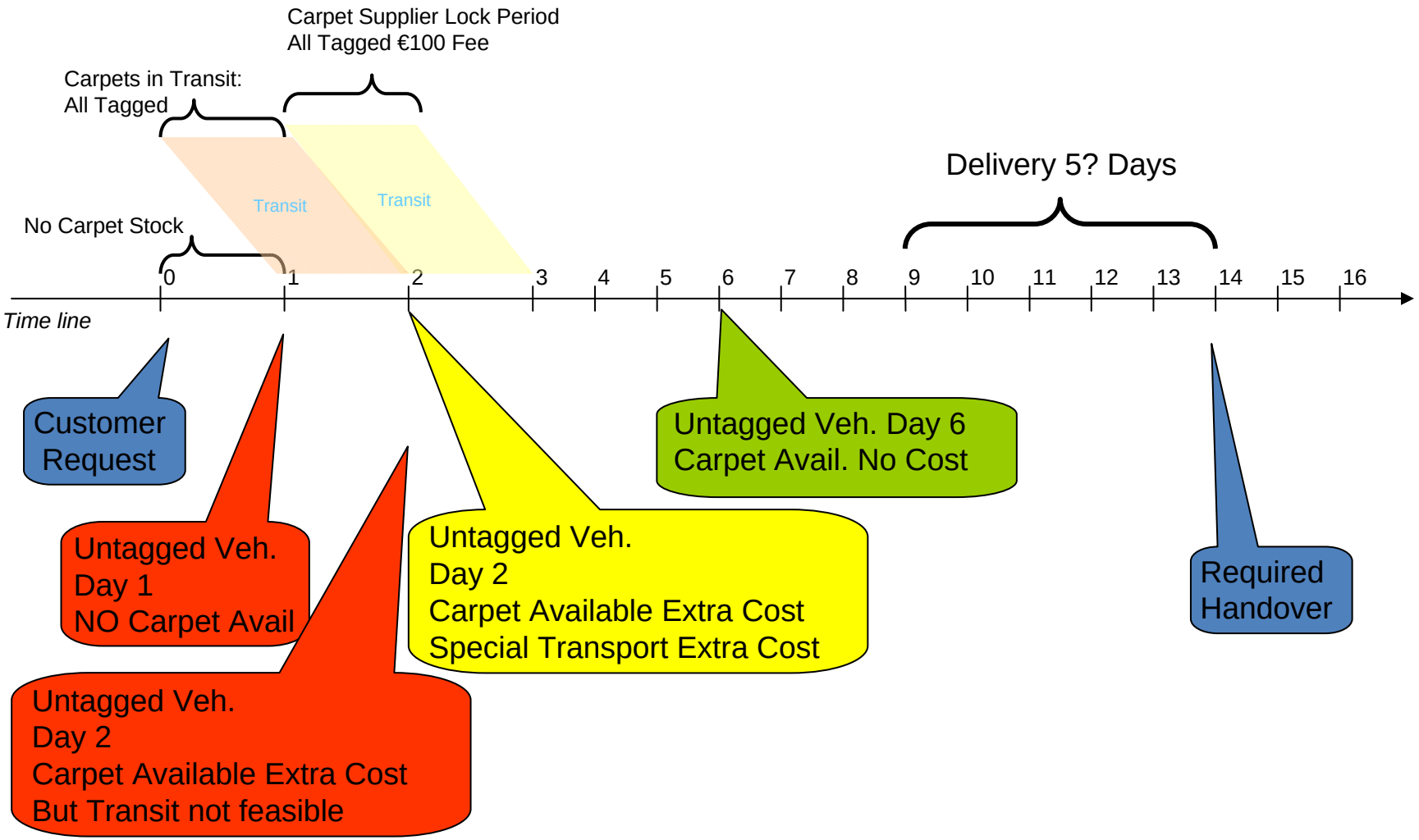
IF Part NOT in Supplier Inventory THEN Extra Cost for Rescheduling and Production

$$C_{extra} = C_e + C_{st}$$

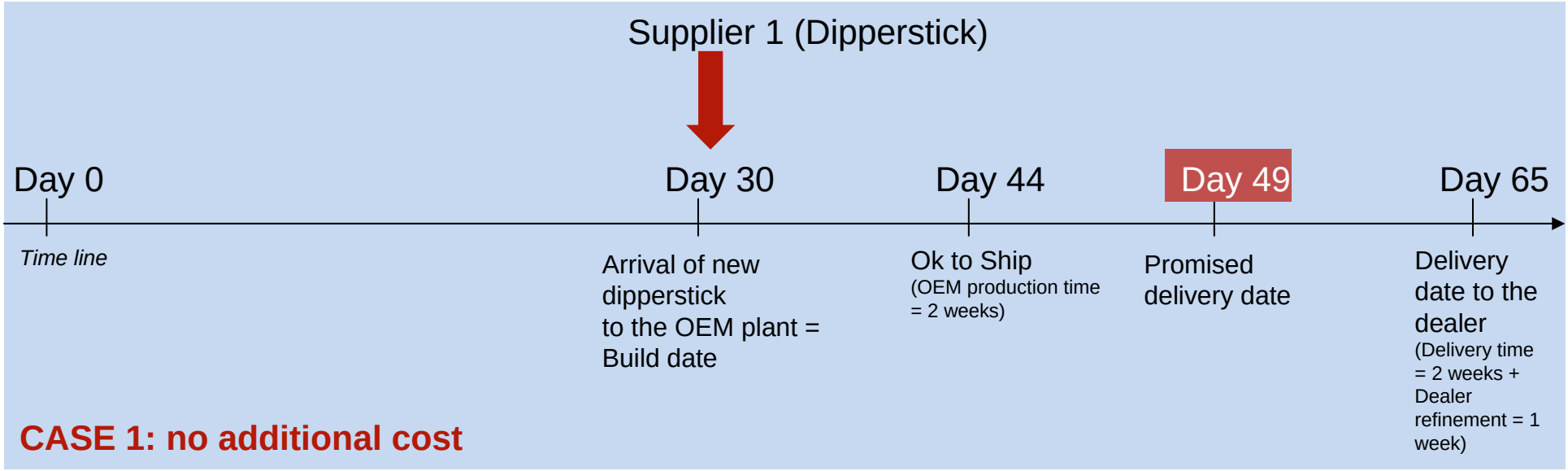


(Makris et al, 2011)

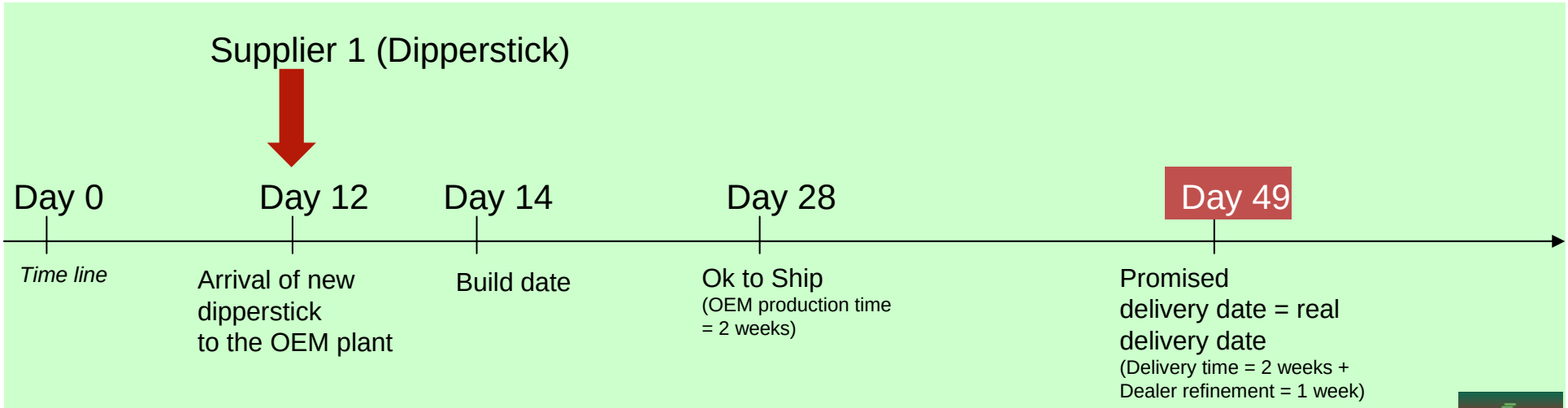
Passenger cars scenario



Construction equipment scenario



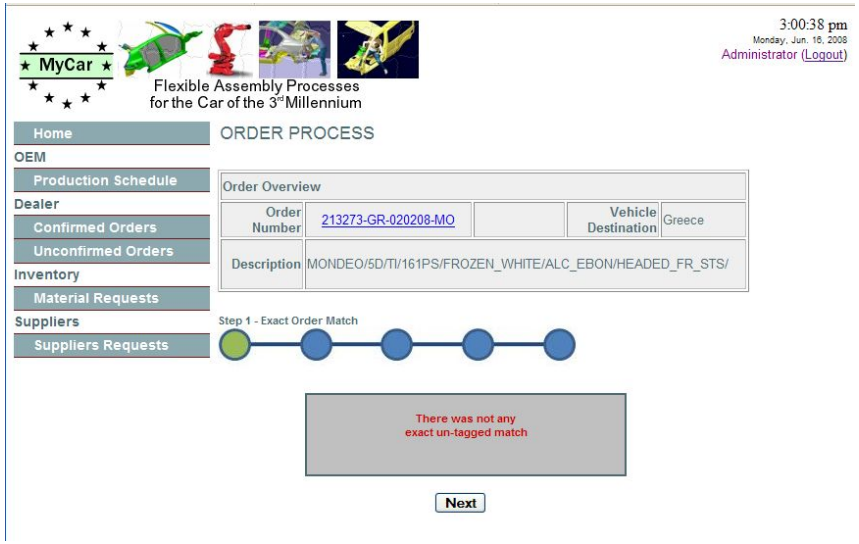
CASE 1: no additional cost



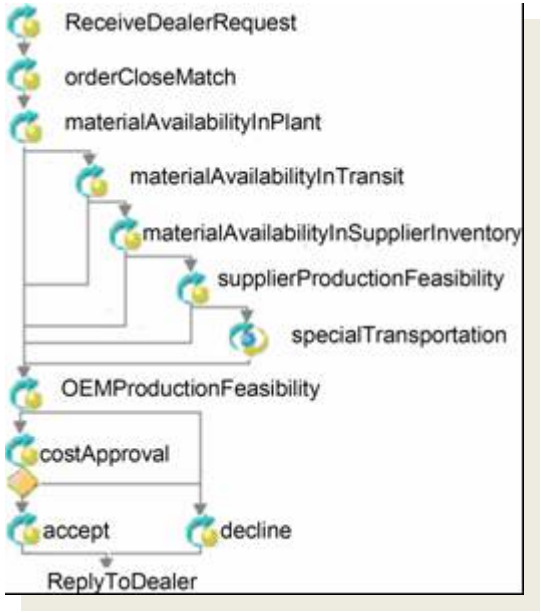
CASE 2: additional cost

Software tool implementation

User interface snapshot



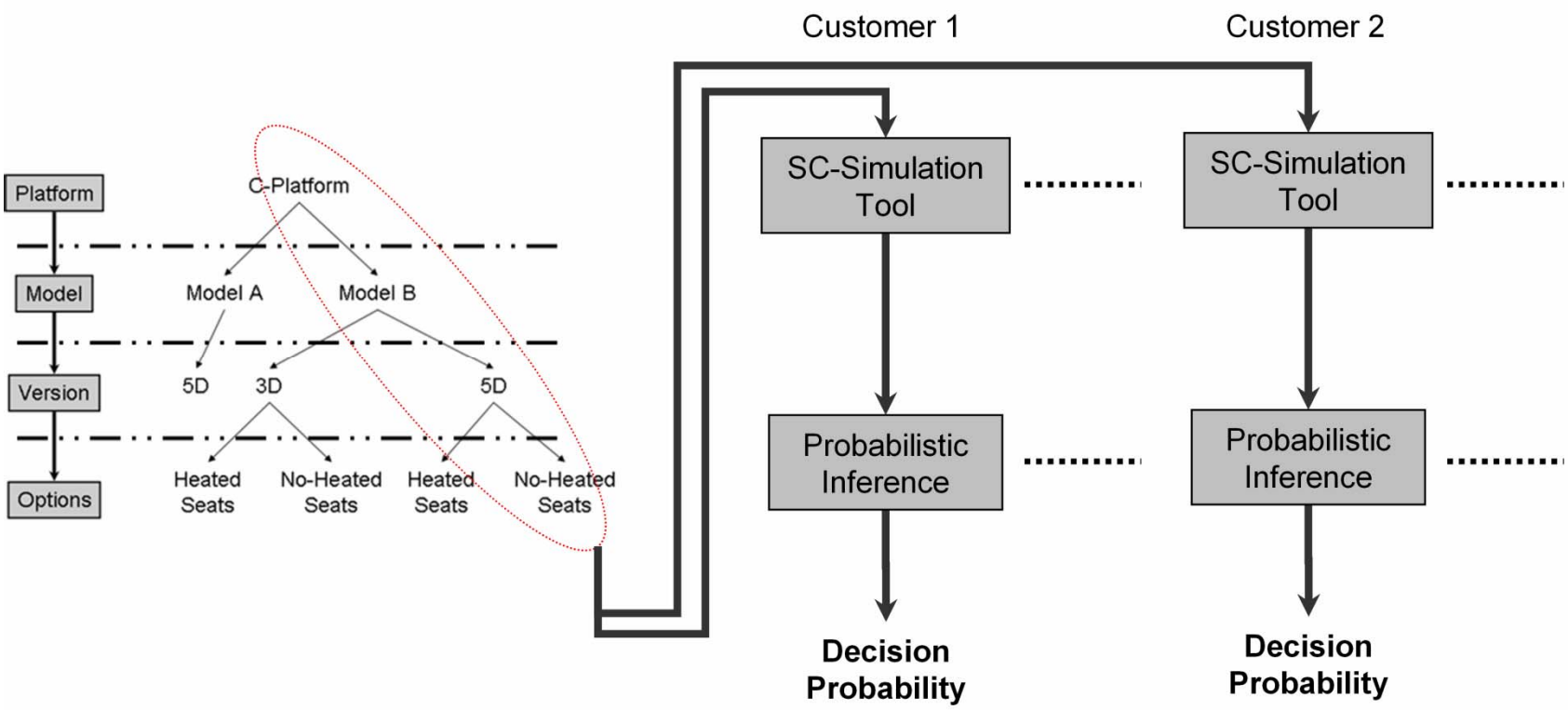
Web services architecture



(ActiveBPEL, 2007)

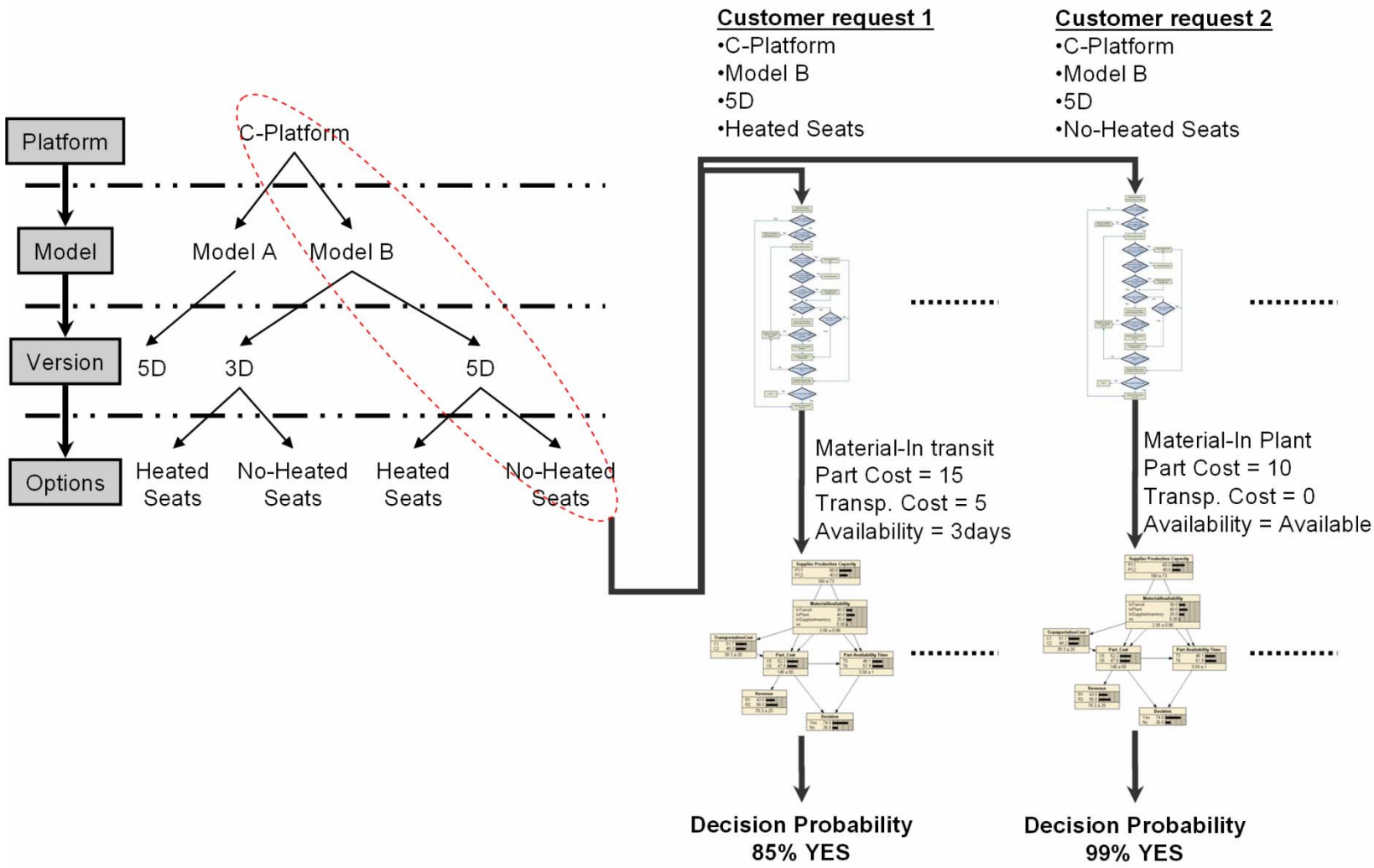
(Makris et al, 2011)

Simulation considering buyer behavior model



(Makris et al, 2011)

Supply chain probabilistic inference



(Makris et al, 2011)

Outcome of the simulation

	Target Delivery Date	Actual Delivery Date	OEM Profit (€)	Buyer Acceptance Probability (%)
Option 1	Day 49	Day 49	19.500	100 %
Option 2	Day 49	Day 65	25.000	5 %

Passenger cars example

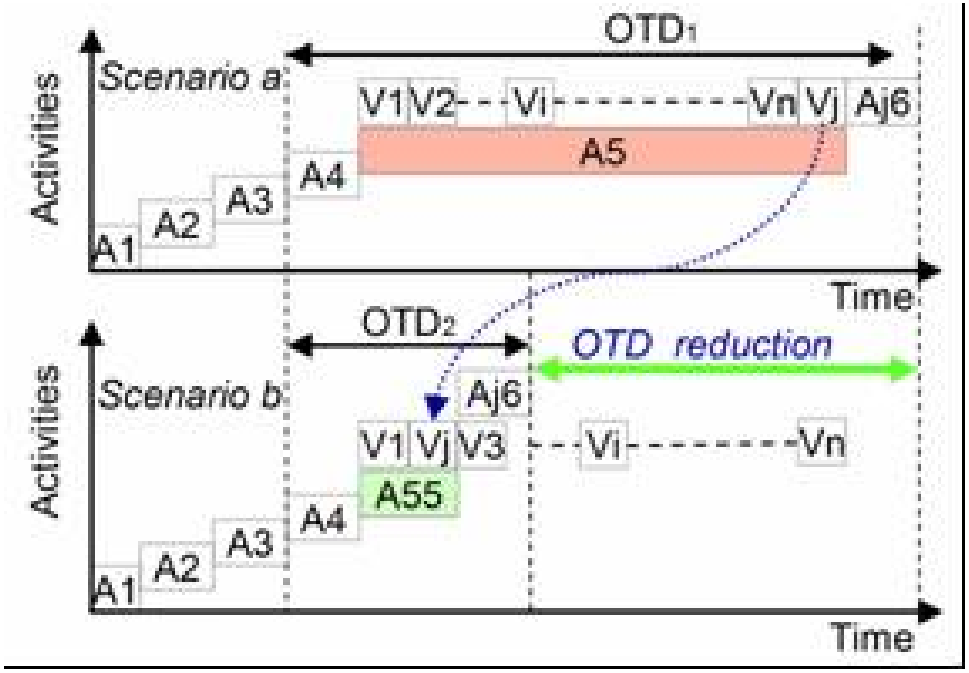
Activity	Description
A1	OEM List of Pre-configured vehicles
A2	Dealer Batch Orders
A3	Customized Order
A4	Customized Order to OEM
A5	OEM schedules *Vj* at the end of running production plan
A55	Execute SCCL - check Feasibility- Build the *Vj* earlier replacing *V2*
Aj6	Deliver the Vehicle j

Activities for vehicle order realization

- **Order size: *300 vehicles / month***
- **Customized Order: Vj based on *pre-configured* - extra option *(SPOILER)***
- **Scenario represented by *Activities A1, A2, A3, A4, A5, Aj6***
- ***Consequence*: Long OTD Time – *Possible Order Cancellation***

(Mourtzis et al, 2008)

Passenger cars result



Order to Delivery Time Reduction

- ***A5 is NOT* performed**
- **OEM takes *the 1st match* of the 300 pre-ordered vehicles and check *SPOILER availability***
- **IF SPOILER *Found* or *Produced* THEN *SCCL check time and cost constraints***
- **SCCL performs A1, A2, A3, A4, A55, AJ6: V_2 is replaced by V_j**
- **<u>Result</u>: OTD_j (b) < OTD_j (a)**

(Mourtzis et al, 2008)

References

- Chryssolouris, G., Manufacturing Systems -Theory and Practice, 2nd Edition, Springer-Verlag, New York, NY; 2006.
- ActiveBPEL Open Source Engine Project, 2007; http://www.active-endpoints.com/active-bpel-engine-overview.htm.
- D. Mourtzis, N. Papakostas, S. Makris, V. Xantakis, G. Chryssolouris, “Supply chain modeling and control for producing highly customized products”, CIRP Annals - Manufacturing Technology, (Vol. 57, No 1, 2008), pp. 451-454.
- S. Makris, P. Zoupas, G. Chryssolouris, “Supply chain control logic for enabling adaptability under uncertainty”, International Journal of Production Research, Volume 49 Issue 1, January 2011, 121-137