Collaborative Design of Supply Networks

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Context of work – case studies
### Scope of work

<table>
<thead>
<tr>
<th>Relationships</th>
<th>Relative Strength</th>
<th>Coordination</th>
<th>Dependence</th>
<th>Value Capture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ownership</td>
<td>Strong</td>
<td>Very substantial</td>
<td>Very high</td>
<td>High</td>
</tr>
<tr>
<td>Equity</td>
<td></td>
<td>Very substantial</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Sourcing and alliance</td>
<td></td>
<td>Substantial</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Contract</td>
<td></td>
<td>Occasional or some</td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Market</td>
<td>Weak</td>
<td>None</td>
<td>Zero</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Traditional Hierarchy**

But also direct interactions between OEM and Tiers 2 and 3

Galbraith, Designing Organizations, 3rd ed.
Motivation of work

1. OEMs need to reduce number of partners they coordinate whilst retaining innovation
2. Need for rapid assembly of teams of SMEs:
   • To pool together capabilities to bid for complex contracts
   • To pool together capacities to handle peaks in demand
3. Need to change teams and supply networks to respond to:
   • Changes in requirements or technologies
   • Changes in demand
   • Performance issues
4. Need to support SME Associations to coordinate the formation and adaptation of such teams.

These needs were always there, but are now amplified by Industry 4.0 trends
DIGICOR Case Study

DIGICOR Decentralised Agile Coordination Across Supply Chains (http://digicor-project.eu/)
Collaborative Design Approach

1. Collaboration: Advisory System <-> People

2. Collaboration between different companies
   - Hierarchical Allocation of Goals
   - Bottom-up team-building to deliver a result
Collaborative Design Approach

Knowledge-based system, using ontological knowledge of domain

Supports five key operations on a team collaboration model
1. Recursive decomposition of goals
2. Allocation of responsibilities for goals (chose a supplier/ a team which can deliver the goal)
3. Operationalisation - deciding how to achieve a goal via a process
4. Decomposing a process
5. Discretionary Step Definition allows goal-driven process selection at run-time
Not only Aerospace – Automotive Scenario

Business Opportunity – Invitation to tender for Category L7E vehicle with L*Ltd, A*Ltd.

They decide to focus on developing a PowerTrain system.
Analyse Business Opportunity

The system uses knowledge from the car structure repository to produce a decomposition of PowerTrain involving Frames, Wheel Suspension, PowerTrain Management and Wheel Hub Motor System.
Assign preferred suppliers, use bundling

- R*Ltd is preferred supplier for Frames, they can also do Wheel suspension so the system chooses them in preference, thus reducing necessary coordination between team members through bundling. C*Ltd is assigned to deliver power train management system.

The system lacks suppliers who can do wheel hub motor system.
The Innovative Solutions Module

PT Management

WHM Management
Wheel Hub Motor System

C*Ltd

System Integration
Assembly Frame

Graco

Motor

S.Ltd

SI can do Assembly Frame!

What about a motor?
Moving to next phase, we need to add extra roles to handle logistics services between partners, and some roles to handle supplying lightweight rods for the frames.
Supporting Collaborative VEs


