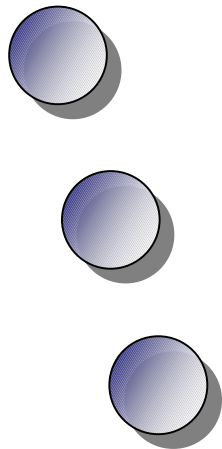


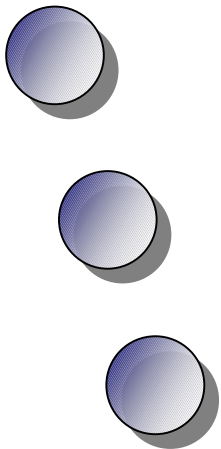
# Lösung komplexer "Pickup and Delivery" Probleme mit modernen Constrainttechniken

Diplomkolloquium  
Mathias Lühr



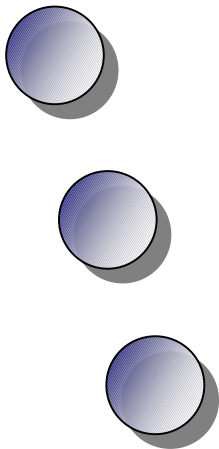
# Einleitung

- " Was ist ein "Pickup and Delivery" Problem?
- " Was ist ein Constraint?
- " Constraintanwendung

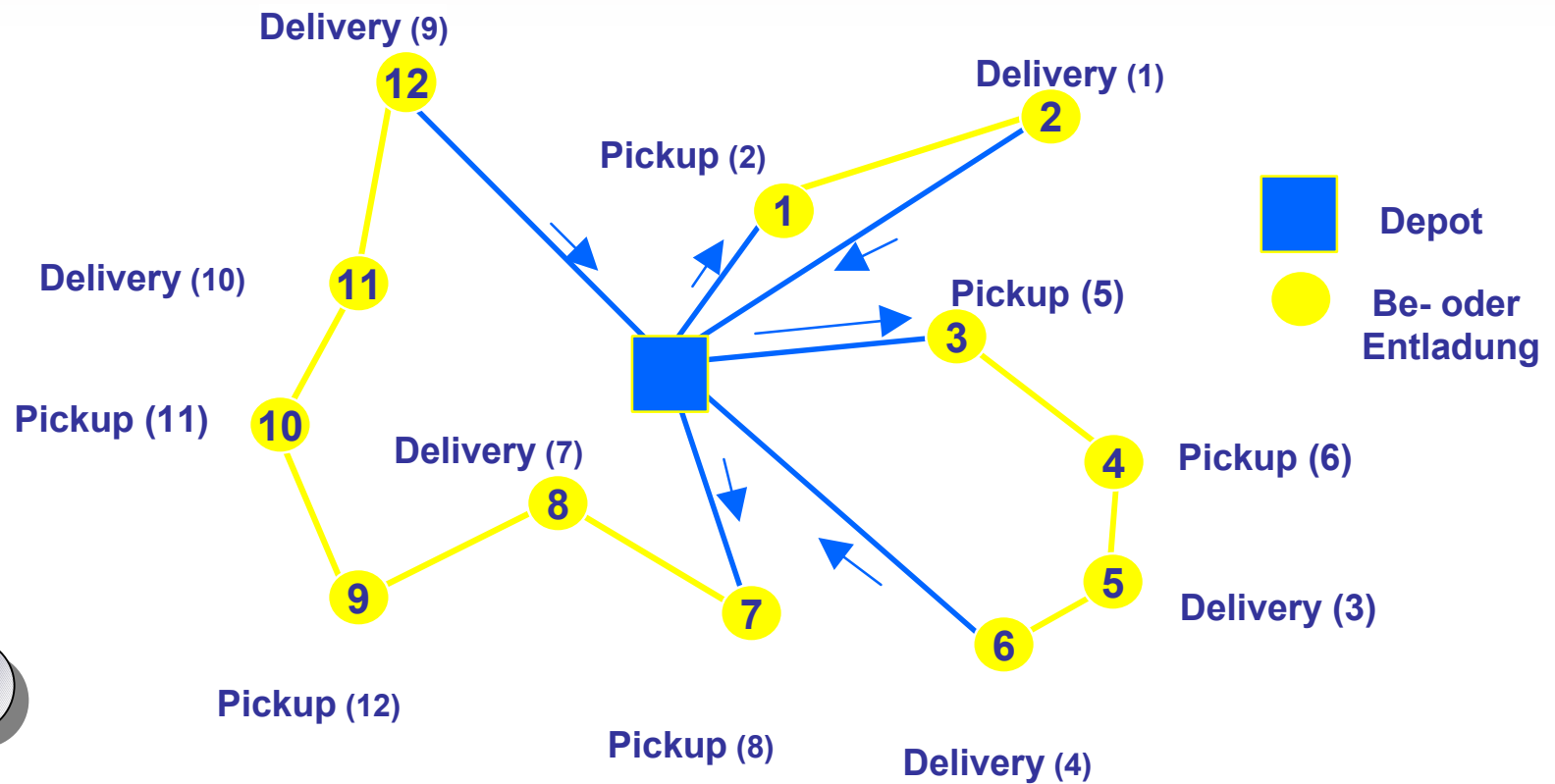


# Was ist ein "Pickup and Delivery" Problem?

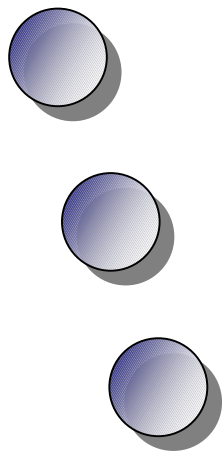
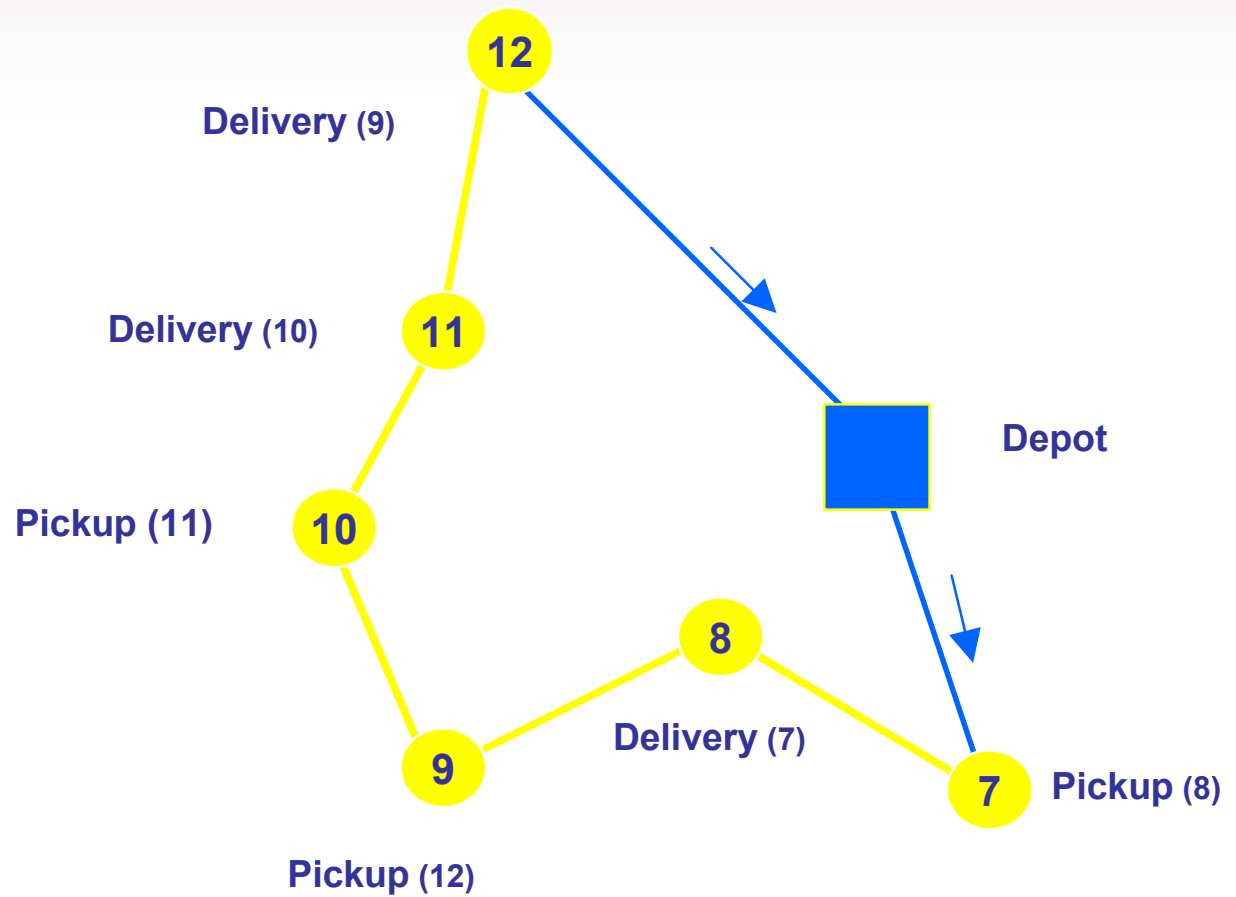
- " Routingproblem
- " Beladen und Entladen
- " Zeitfenster
- " Fahrzeugflotte



# Pickup and Delivery

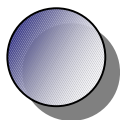
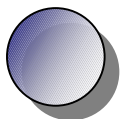
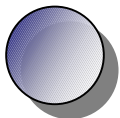


# Problem?

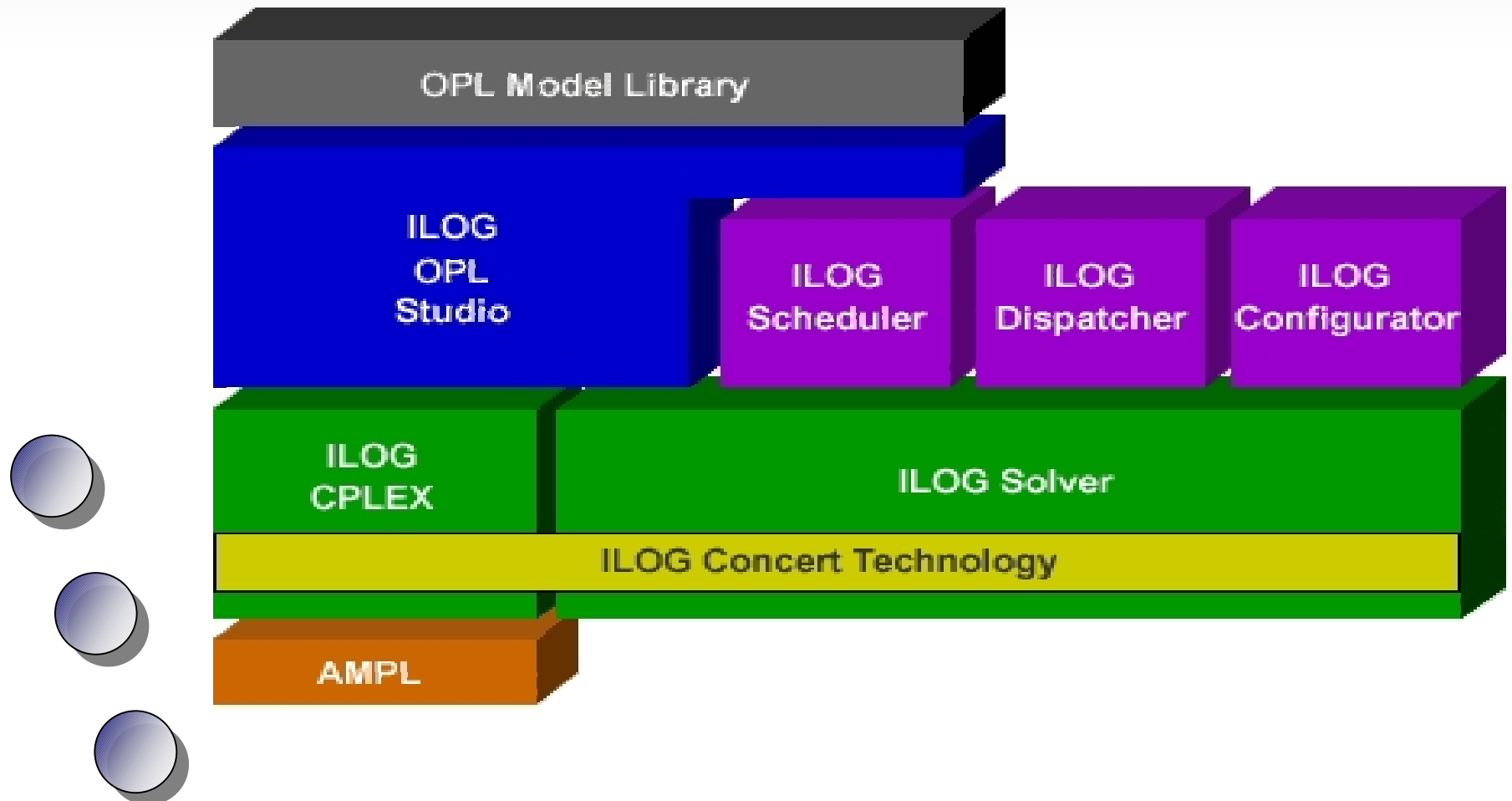


# Constraints

- " Constraint Z Beschränkung
- " Constraintvariable = Variable + Domain
- " Constraintnetz = 2-Constraint +  
Constraintvariablen
- " Knotenkonsistenz
- " Kantenkonsistenz
- " Pfadkonsistenz



# ILOG



# Auftrag

```
<order uID="1">  
  <productID>3</productID>  
  <vehicleClassID>5</vehicleClassID>  
  <vehicleTypeID>11</vehicleTypeID>  
  <pickupNode>6</pickupNode>  
  ...  
  <deliveryNode>16</deliveryNode>  
  <supplyPeriod>  
    <from>2000-03-13T10:26:32:000+01:00</from>  
    <to>2000-03-13T18:59:58:000+01:00</to>  
  </supplyPeriod>  
  <quantityVolume>0</quantityVolume>  
  <quantityMass>298170</quantityMass>  
  <maximumTardiness>P0Y0M0D0T2H29M0.0S</maximumTardiness>  
  <preloaded>>false</preloaded>  
  <needCleaning>>false</needCleaning>
```



# Lieferzeit

```
if (myOrder->getNextSupplyPeriod(from, to))
{
    thisModel.add(from <=
                    iloDelivery.getCumulVar(time)
                    <= to + maxTardiness);

    IloNumVar supplyTard(myEnv, 0, to + maxTardiness);
    thisModel.add(supplyTard >=
                  iloDelivery.getCumulVar(time) - to);
    thisModel.add(iloDelivery.getTransitVar(tardiness) ==
                  supplyTard);
}
```