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Optimisation and the Internet:

From Web-based Applications to Web-Services

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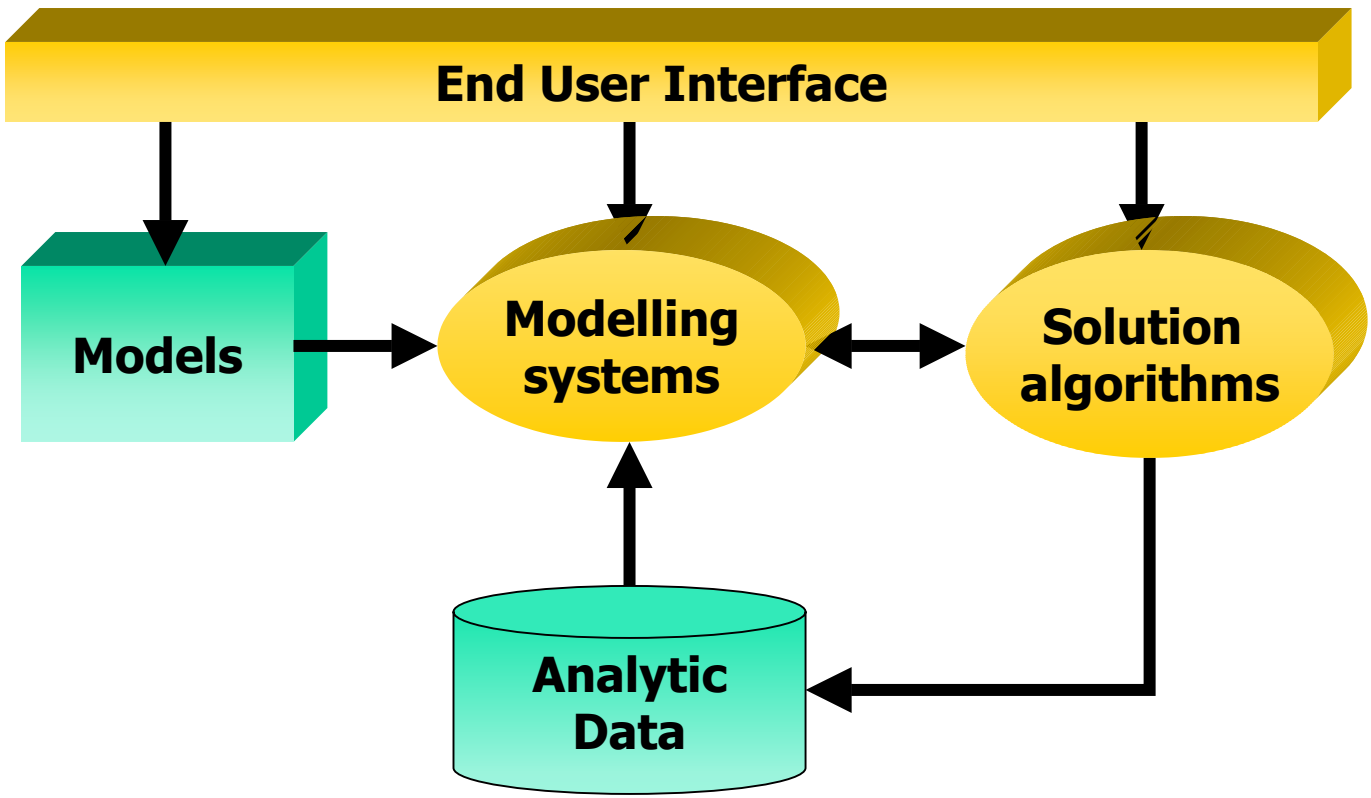
Outline

- Optimisation tools: evolution
- The ASP model
- Optimisation Service Provision (OSP)
- e-Services
- WebOpt
- Conclusions

Optimisation tools interaction

Traditionally, optimisation based applications comprise models, optimisers and analytical data, connected via a model management system.



Evolution: until the 1990s

- Proprietary tools. Optimisation routines and models are hard coded into the system
- Pros:
  - Close match to application requirement
  - Computational Efficiency
  - Customised data mart and reporting facilities
- Cons:
  - Expensive and time consuming to build
  - Poor connectivity to other applications
  - In general, non-flexible and hard to adapt when the application changes

Evolution: the 1990s

- Off-the shelf tools: Optimisers and Modelling Systems
- Variety of modelling systems possess database and solver connectivity
- Pros:
  - Rapid prototyping can be achieved
  - Industry standard connectivity to other applications such as databases and reporting tools
  - Models can be communicated in file form between different analysts and users

  Cons:
  - Customised DSS still developed using proprietary technology
  - Reliability of the tool associated with the vendor
  - Incompatibility between different tools

Evolution: nowadays

- Optimisation increasingly used as an inference engine
- Modelling systems and solvers are becoming available in **component form**
- Optimisation tools now allow more MP paradigms (QMIP and SP)
- Internet technology has facilitated the creation of distributed applications

Application Service Provision (ASP)

- According to the definition:
  - The provision of applications over an electronic network
- In practice:
  - Delivery of software programs via Web browsers or other internet-based clients
- Underlying idea:
  - Outsourcing of (computation) resources

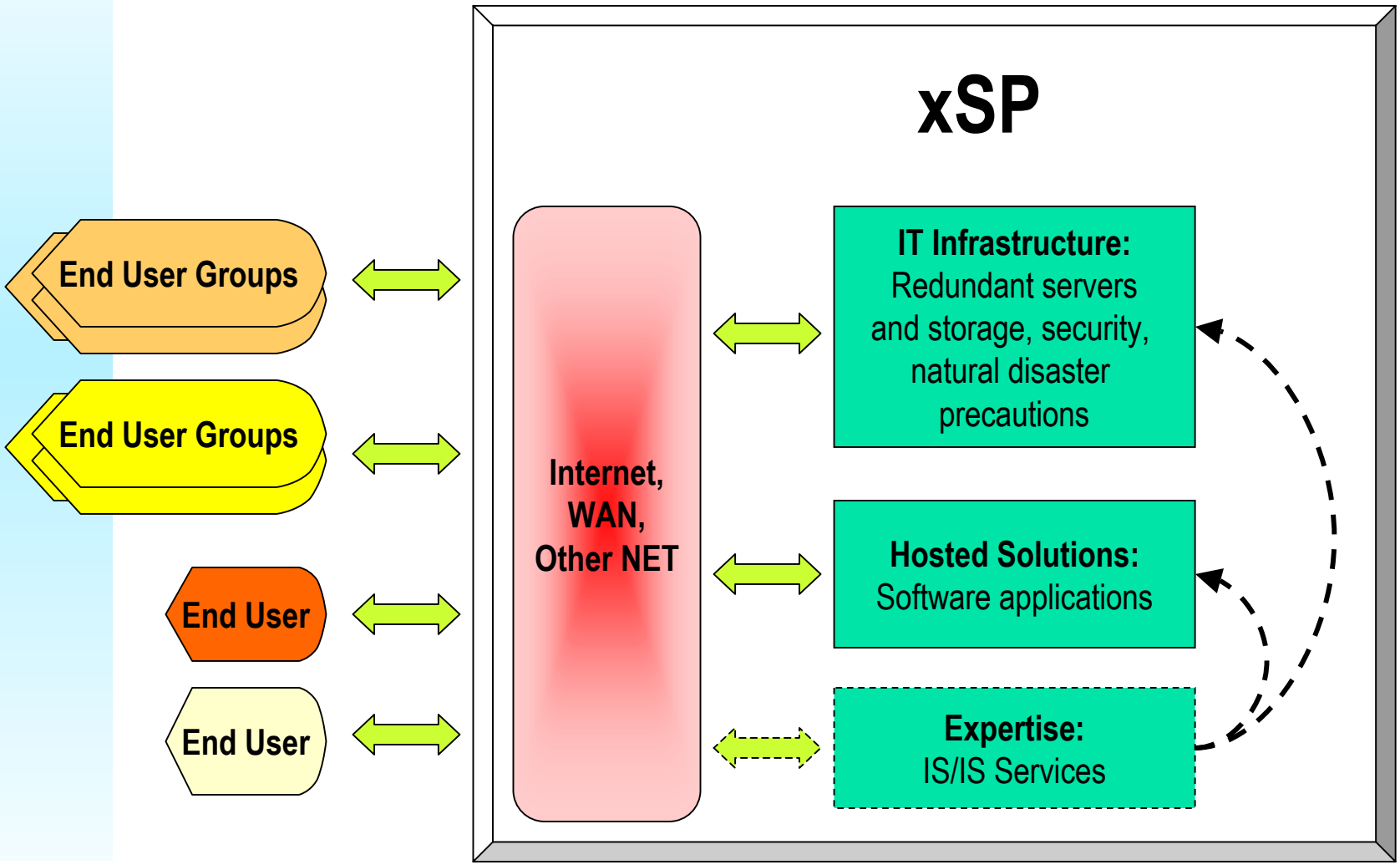
Application Service Provision (ASP)

- Application Service Provision (ASP) is promising to reduce the costs of acquiring state-of-the-art IT
- ASP ensures robustness, uptime and upgrade paths
- ASP take up the cost of acquiring, securing, configuring, and maintaining, on behalf of a client, all necessary IT infrastructure, in return of a pay-as-you-go fee

xSP

- The idea of application service provision is extended to include the provision of other IT and IS features:
  - MSP (Managed Service Providers)
  - NSP (Network Service Providers)
  - VSP (Vertical Application Providers)

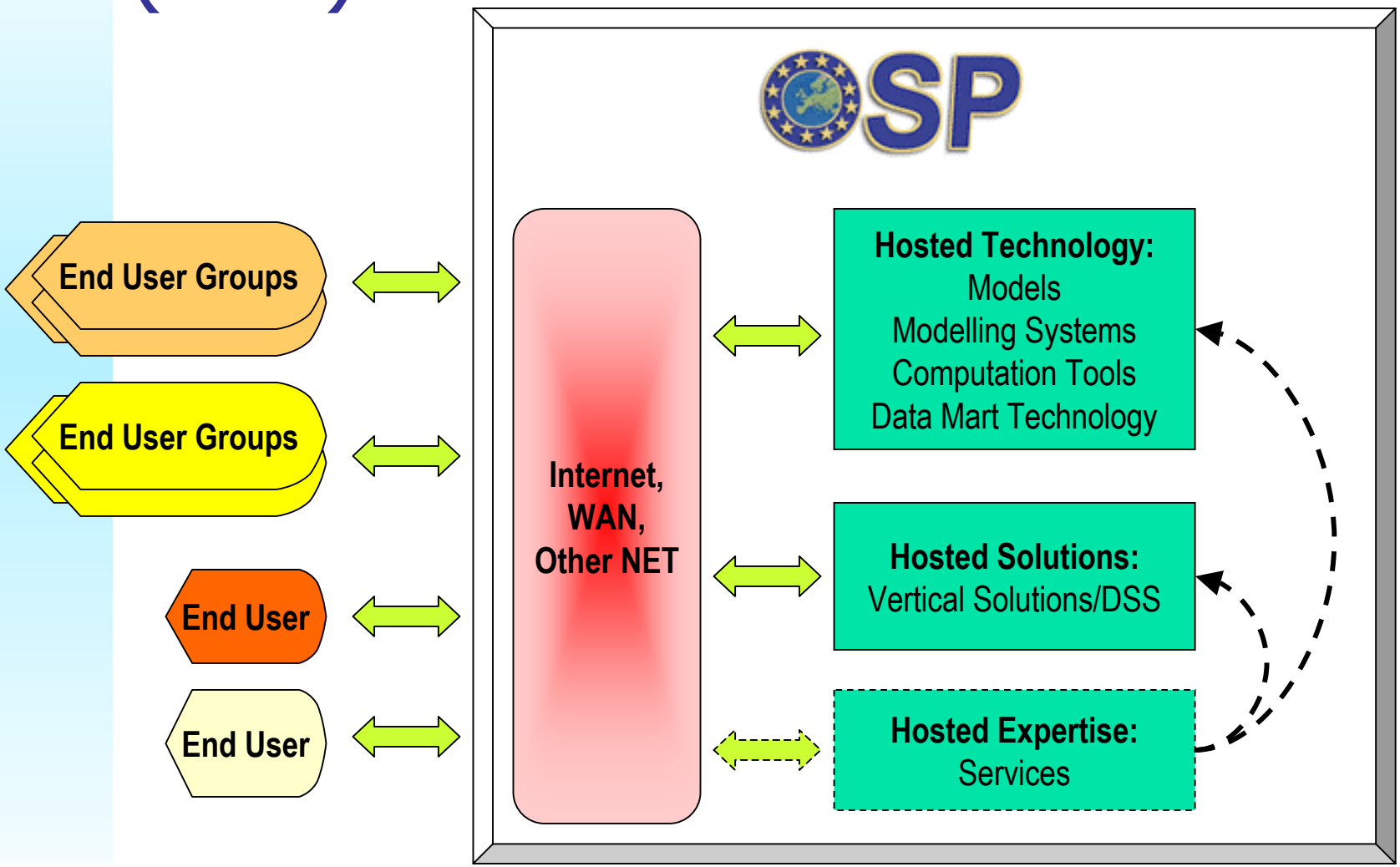
Typical xSP Solution



OSP: Overview

- Optimisation Service Provider
- EU craft project IST-1999-56410
- Adopts the xSP model specifically for the delivery of:
  - Optimisation tools
  - Vertical applications (Optimisation based DSS)
  - Expertise (Training material)
- Other approaches: NEOS,GRID

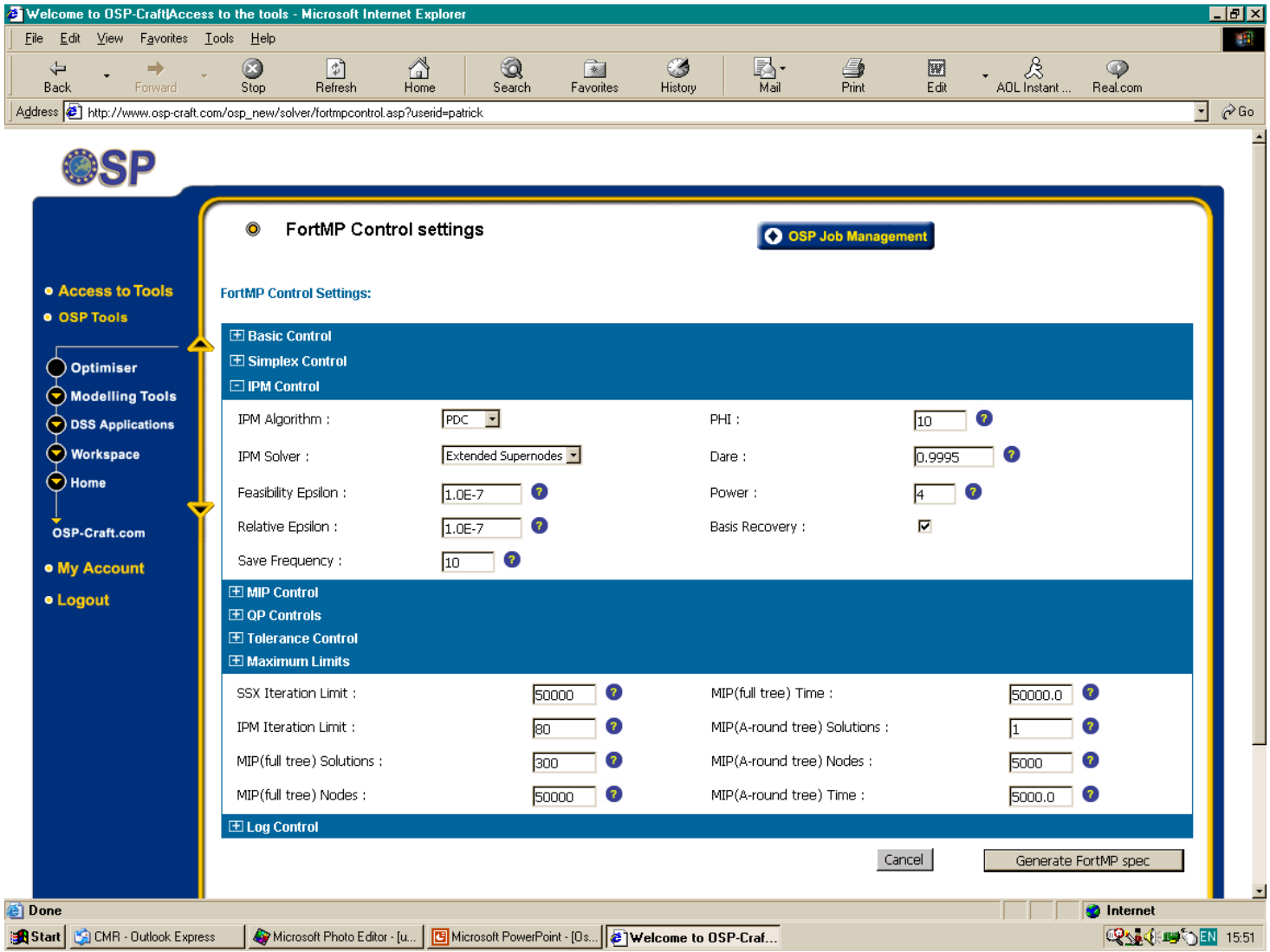
Optimisation Service Provision (OSP)



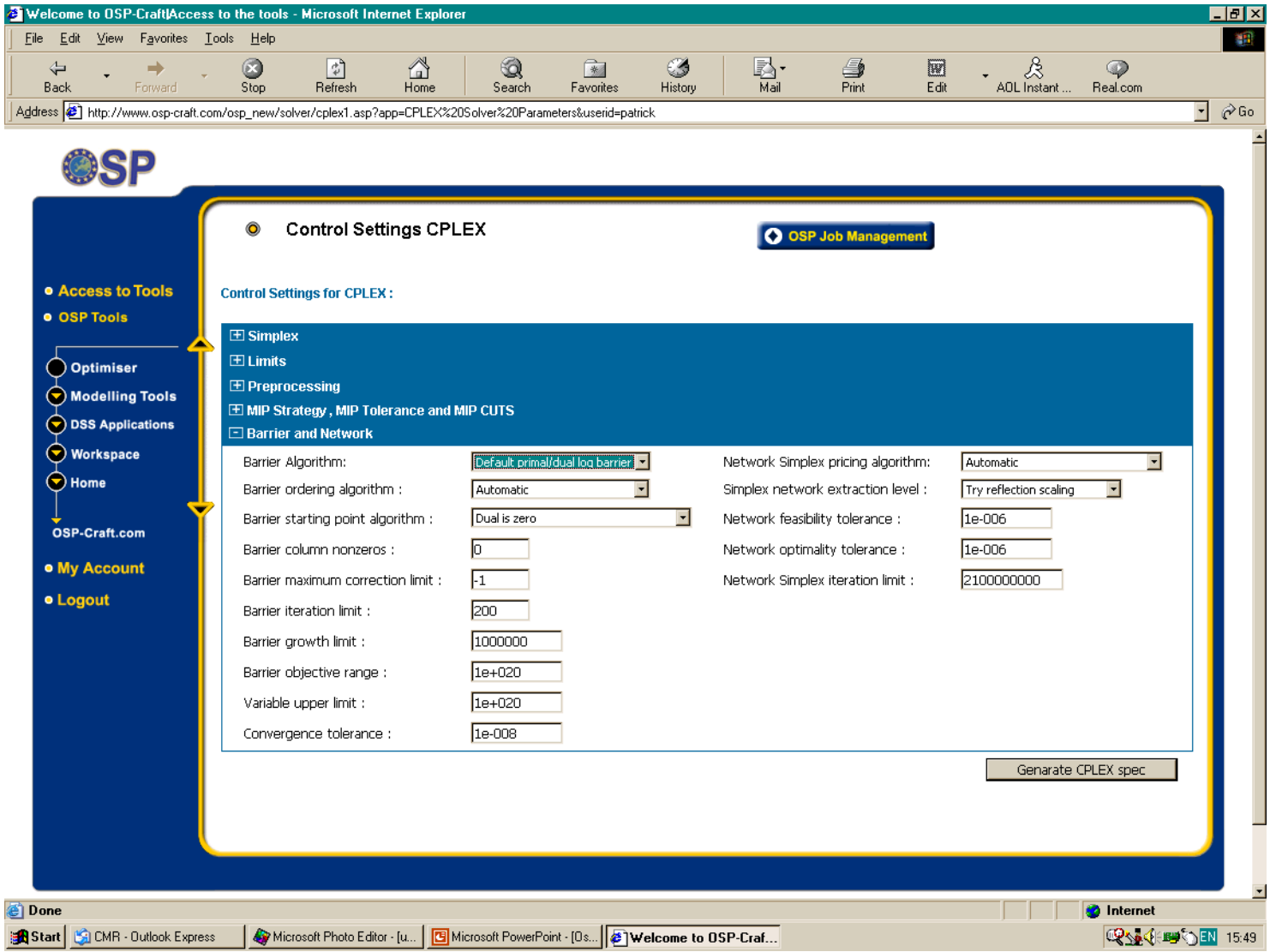
OSP components

- Solvers
  - CPLEX
  - OSL
  - FortMP
  - FortSP (SPInE's stochastic programming solver)
- Modelling systems
  - MPL
  - AMPL
- Vertical applications
  - Portfolio
  - Supply chain

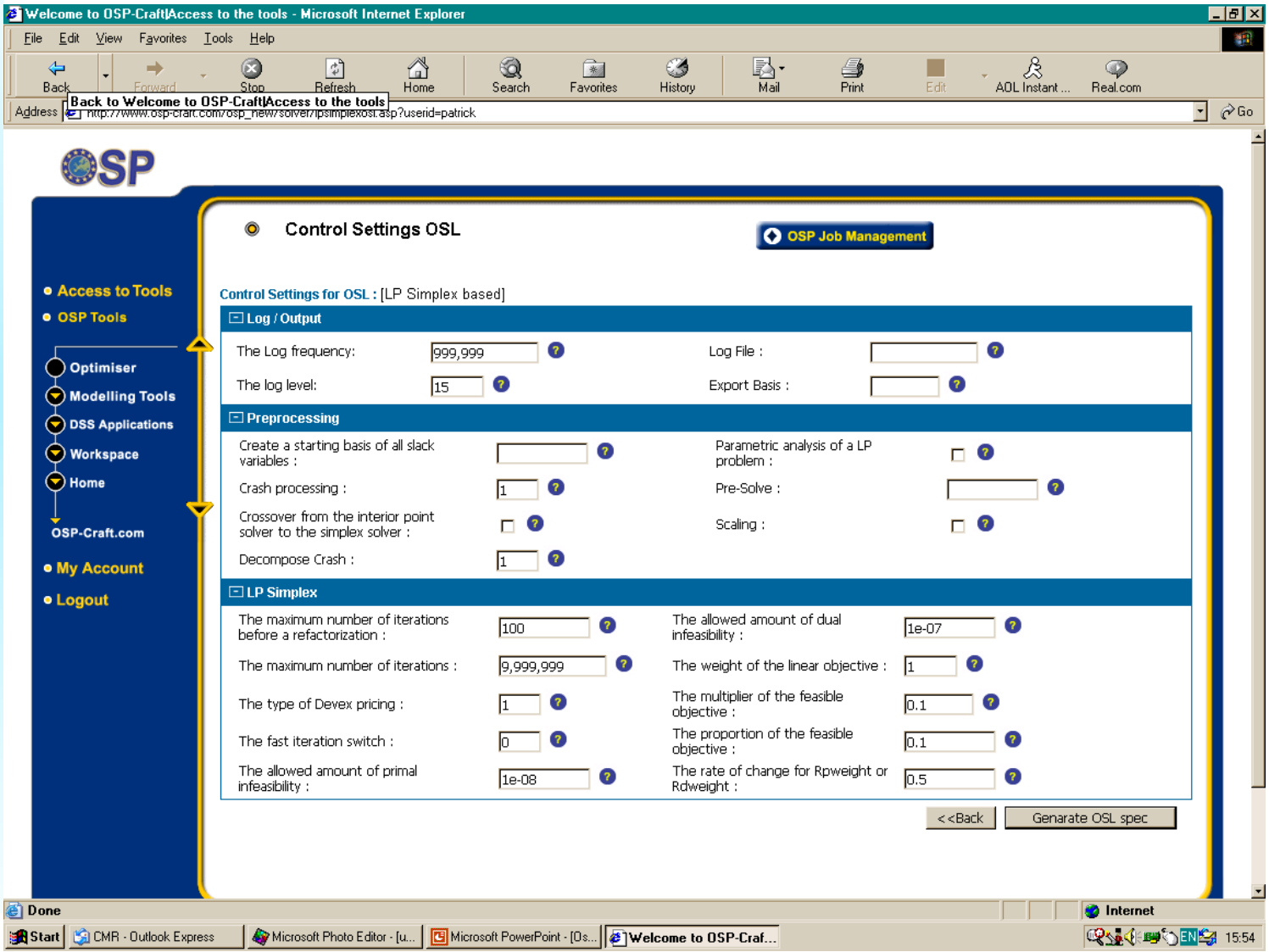
Solver Engines: FortMP



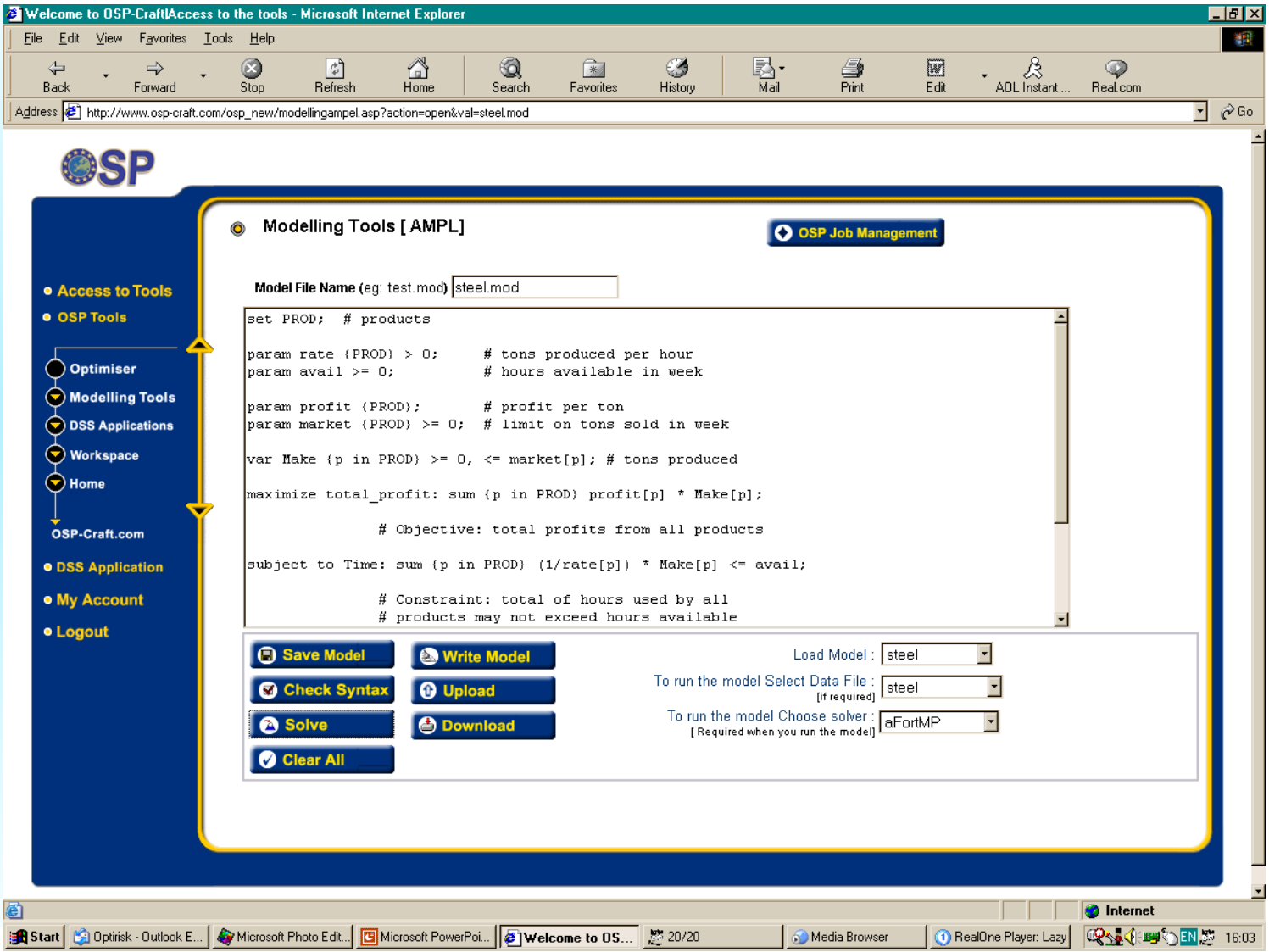
Solver Engines: CPLEX



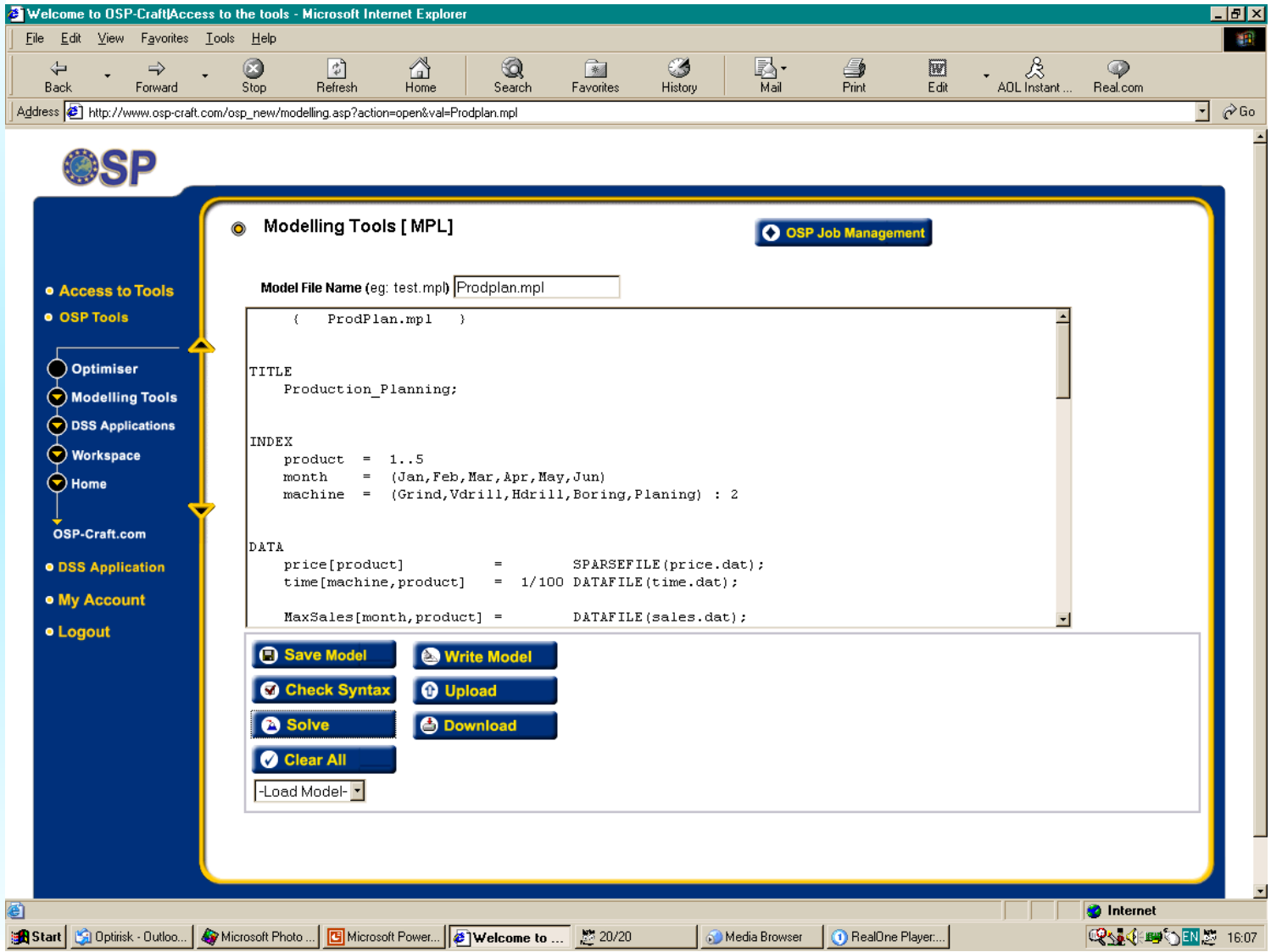
Solver Engines: OSL



Modelling systems: AMPL

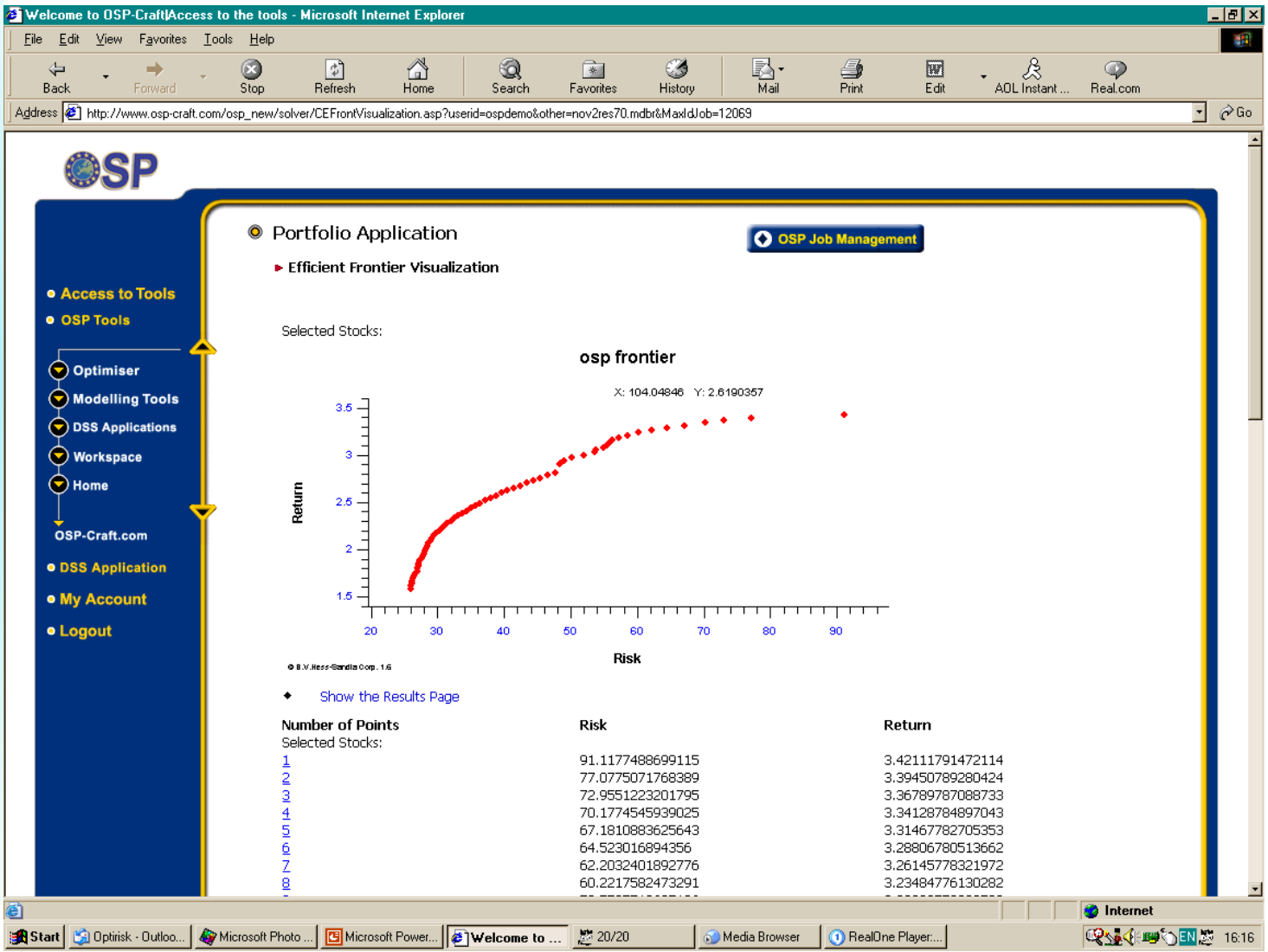


Modelling systems: MPL



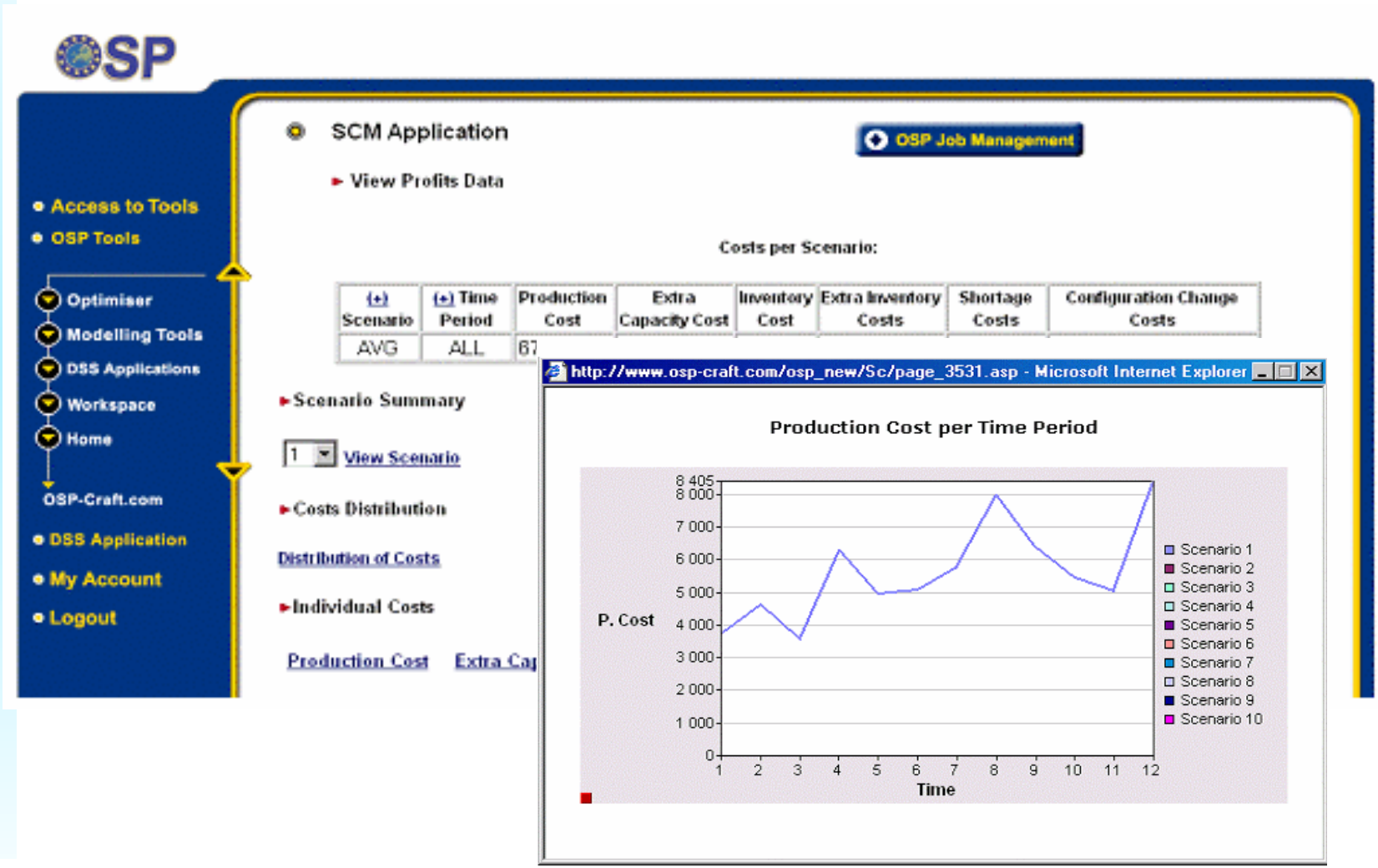
Vertical applications: Portfolio

(Discrete Efficient Frontier Visualisation)



Vertical applications: SCM

(Discrete Efficient Frontier Visualisation)

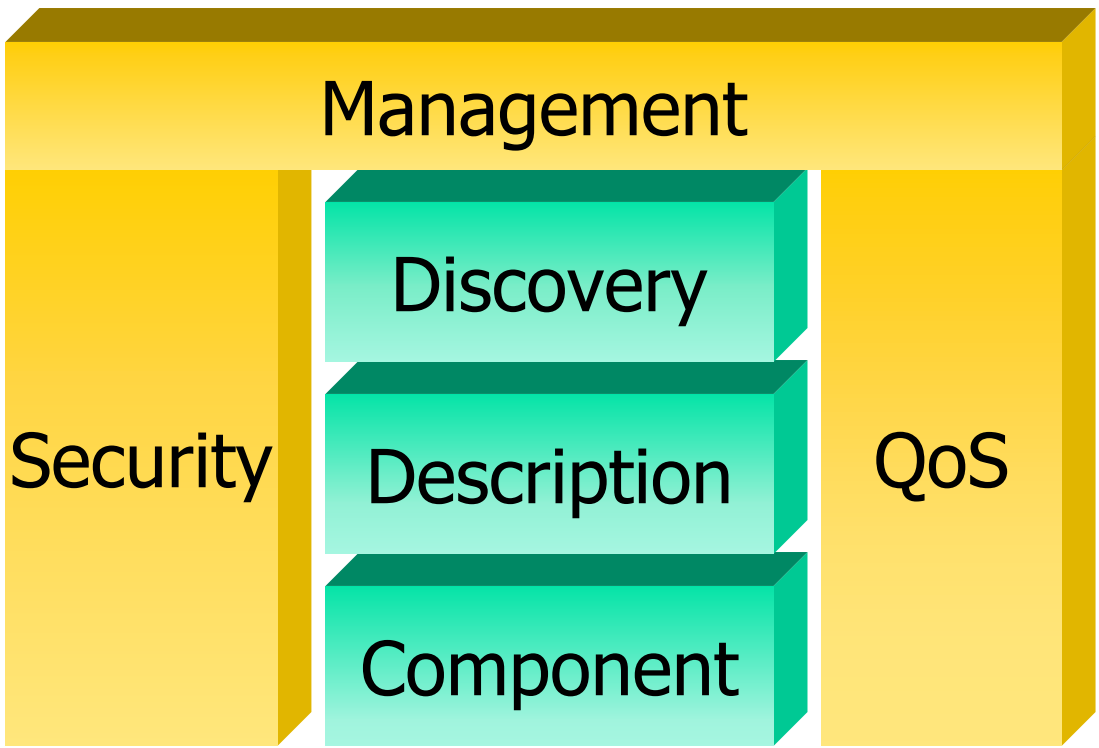


e-Services

- According to the definition:
  - The provision of **services** over an electronic network
- In practice:
  - Extends ASP by enriching the underlying application with support infrastructure
  - Merge several xSP's into one
- Underlying ideas:
  - Components and customer focus

e-Services

- Technology based on the concept of web-service



e-Services and optimisation

WebOpt

- EU-sponsored ASIA IT&C project
- Promotes knowledge transfer and collaboration between Europe and Asia
- Extends OSP by implementing optimisation web-services
- The aim is to develop complete optimisation e-Services

Conclusions

- ASP is a viable model for optimisation (See OSP)
- Optimisation components are becoming all the more important in DSS
- Deployment of optimisation in BPM requires DSS with extended features
- E-Services are a natural direction for the provision of optimisation tools