

Cross-Organizational Workflow Management

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Part 1

Introduction to Cross-Organizational
Workflow Management - *or* - Workflow
Support for eBusiness

Part 2

CrossFlow - An Approach to Combining
Workflow Management and Electronic
Commerce

Part 1: XO-WFM

Workflow Support for eBusiness

- Recap Workflow Management
 - concepts
 - architecture
- Cross-Organizational Workflows
 - concepts
 - process models
- XO-WFM Architectures
 - models
 - technologies

Workflow Management: Concepts & Architecture

*a short recapitulation of
workflow basics*

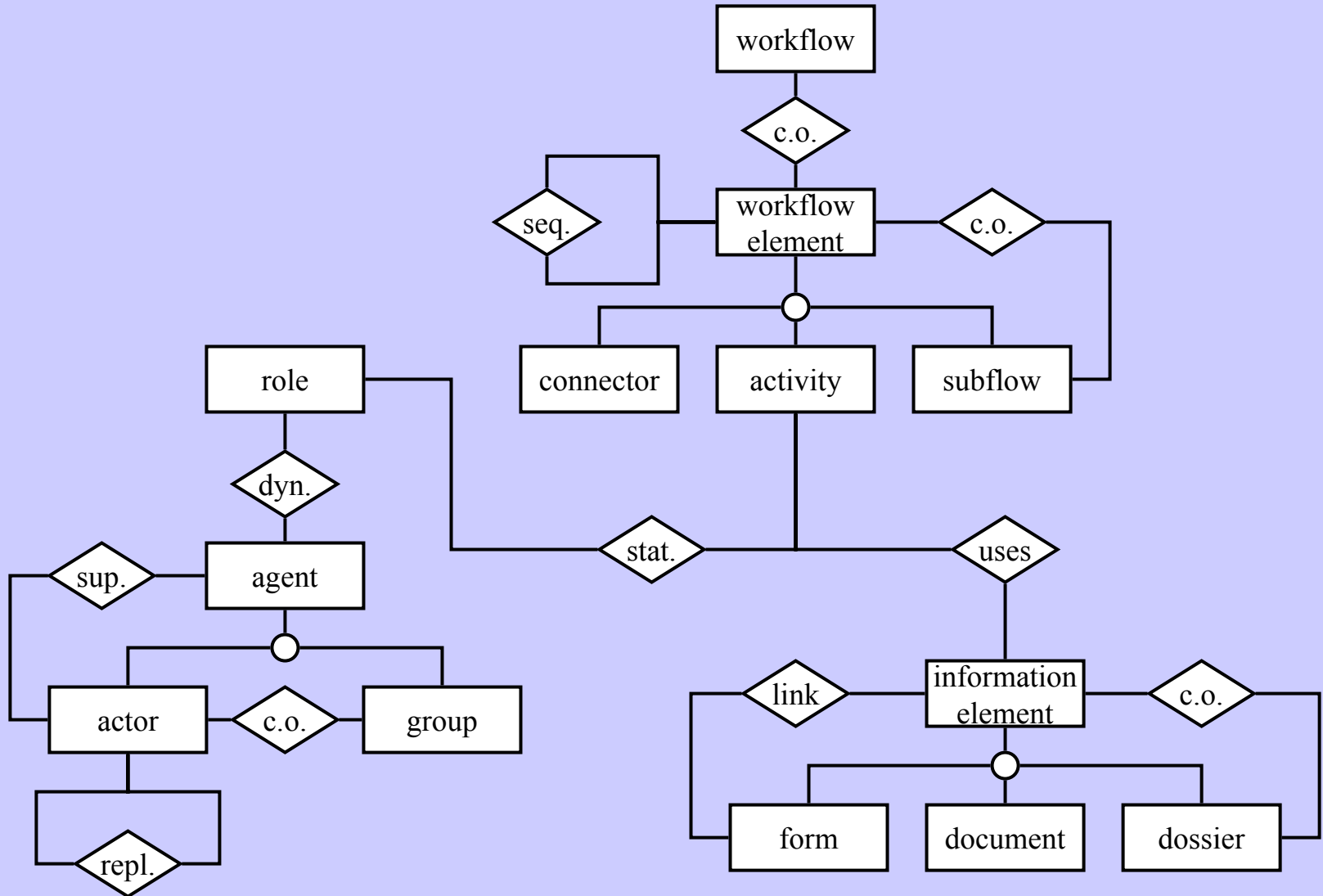
Workflow Management

- WFM = Administrative Logistics
- Getting
 - the right information (documents)
 - at the right time
 - to the right person
- Emphasis
 - on structure of work processes (workflows)
 - not on contents of work processes (AIS!)

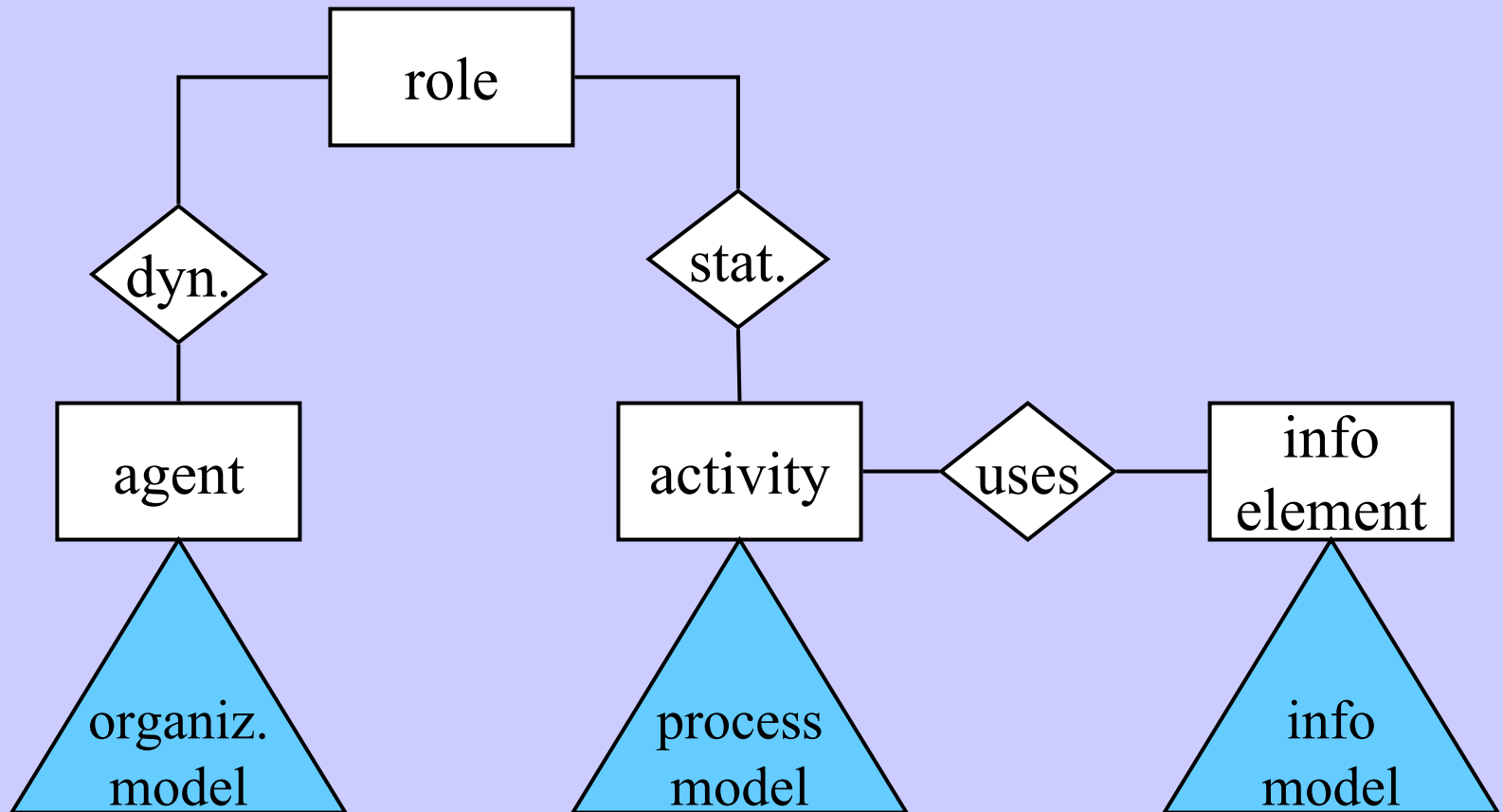
Workflow Management Aspects

- Routing of information/documents
- Allocation of tasks to actors
- Scheduling of tasks in time
- Scheduling of scarce resources
- Monitoring flow of work
- Handling exceptional situations
- Providing management information

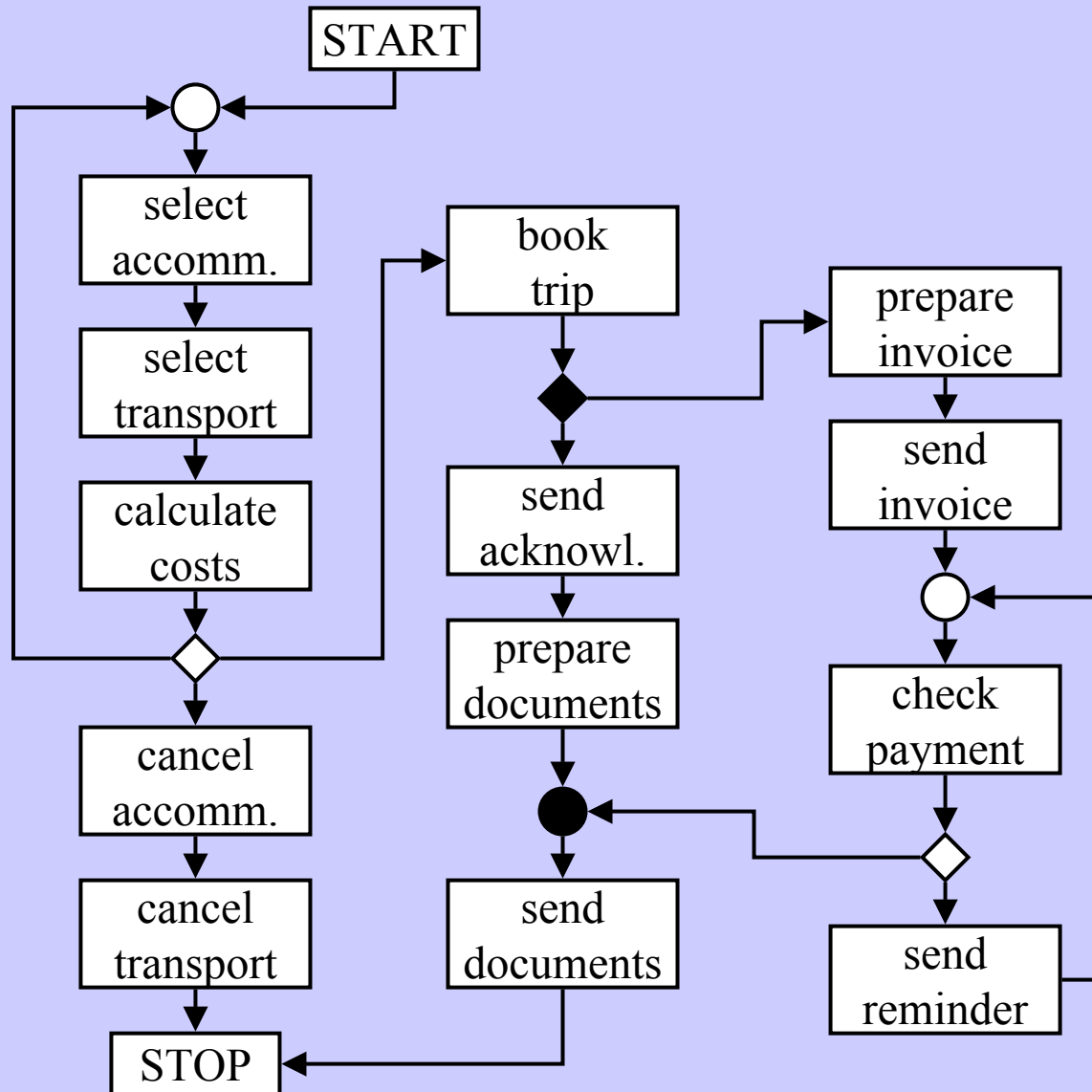
WFM Concepts



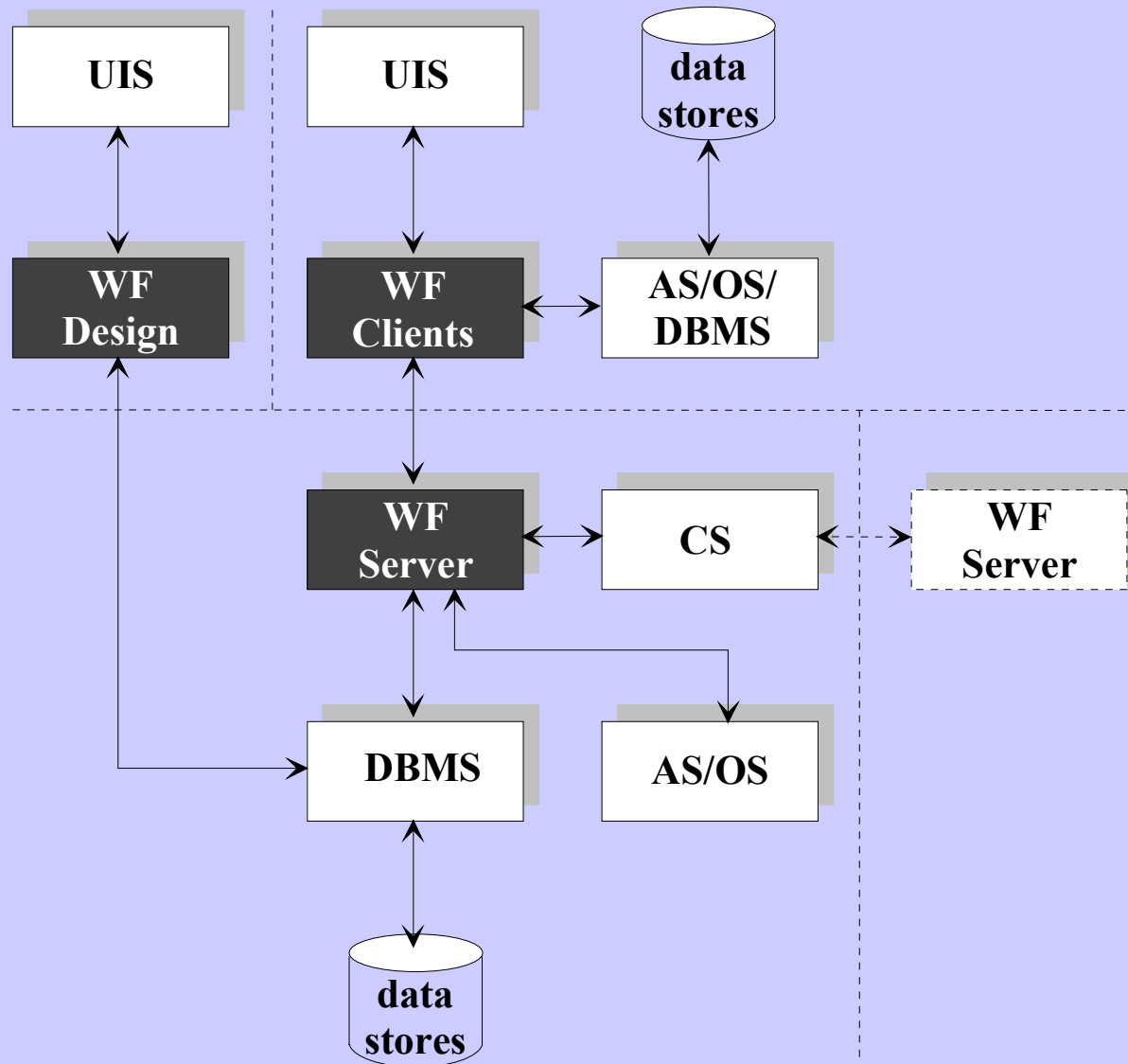
WFM Concepts (Summarized)



Example WF



WFMS Architecture



- eBusiness context
 - competitiveness
 - efficient process execution
 - short response times
 - just-in-time processes
 - changing markets
 - flexibility in processes and products
 - changes in process structures
 - changes in process data
- Explicit, structured process management

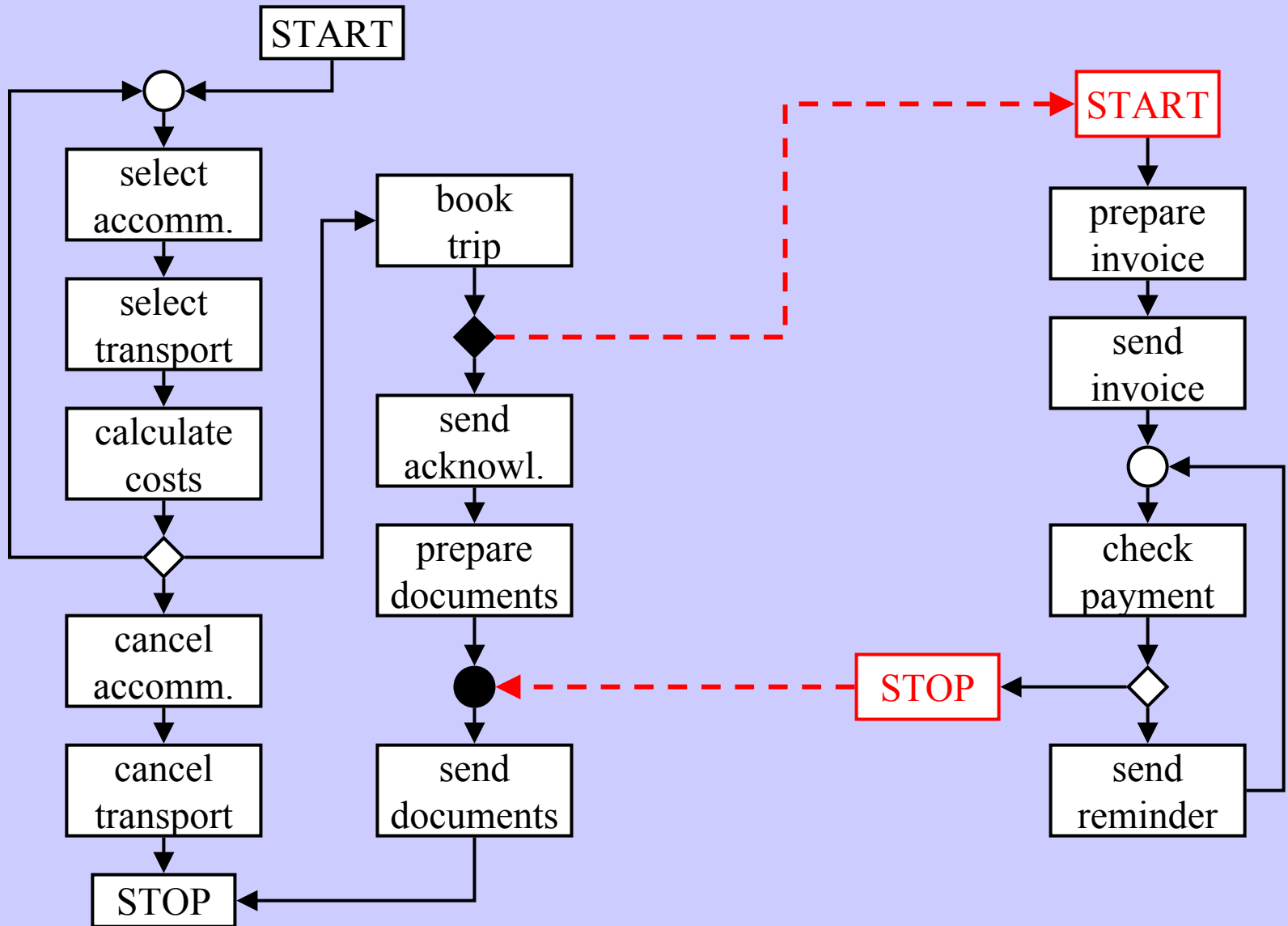
Cross-Organizational Workflows

*having business processes
crossing boundaries*

- Intra-organizational WFM in eBusiness uses automated support for business process management *within* organization boundaries
- Cross-organizational WFM in eBusiness uses automated support for business processes management *across* organization boundaries
- Both forms can be coupled or integrated to get complete process support in virtual organizations

- Cross-organizational workflows
 - workflow instance enacted by multiple organizations
 - tight coupling of business processes of multiple organizations
- Application areas
 - production chains
 - comakerhips
 - service outsourcing
 - virtual enterprises

Example XO-WF



- Distribution
 - distributed process definition
 - distributed process enactment
- Heterogeneity
 - different process/data standards
 - different software/hardware platforms
- Autonomy
 - local decisions w.r.t. workflow enactment

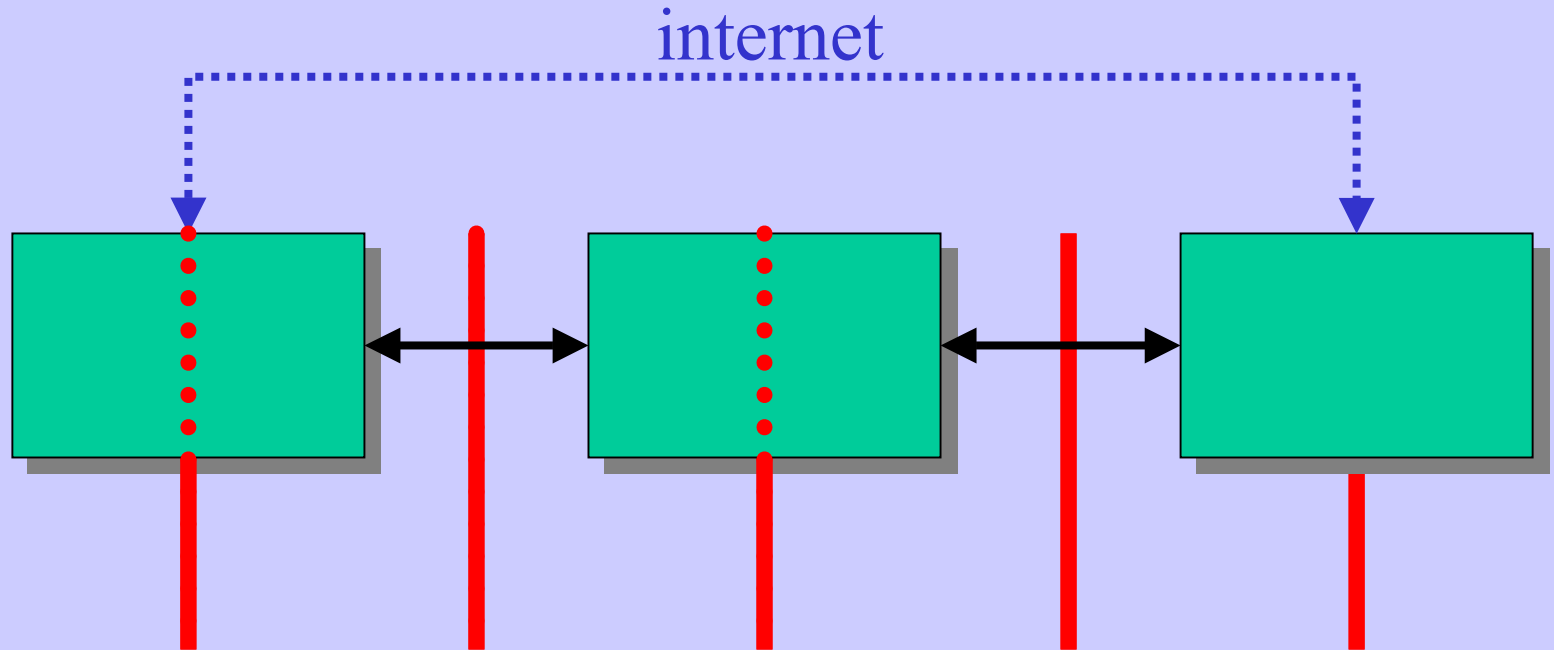
- Encapsulation (abstraction)
 - hiding of private details (competition)
 - hiding of uninteresting details (service)
- Standardization
 - process structures
 - data structures
 - interaction protocols
 - abstraction for right level
 - bilateral or market segments

XO-WFM

Software Architectures

*system support for
cross-organizational workflows*

Distribution in XO-WFM



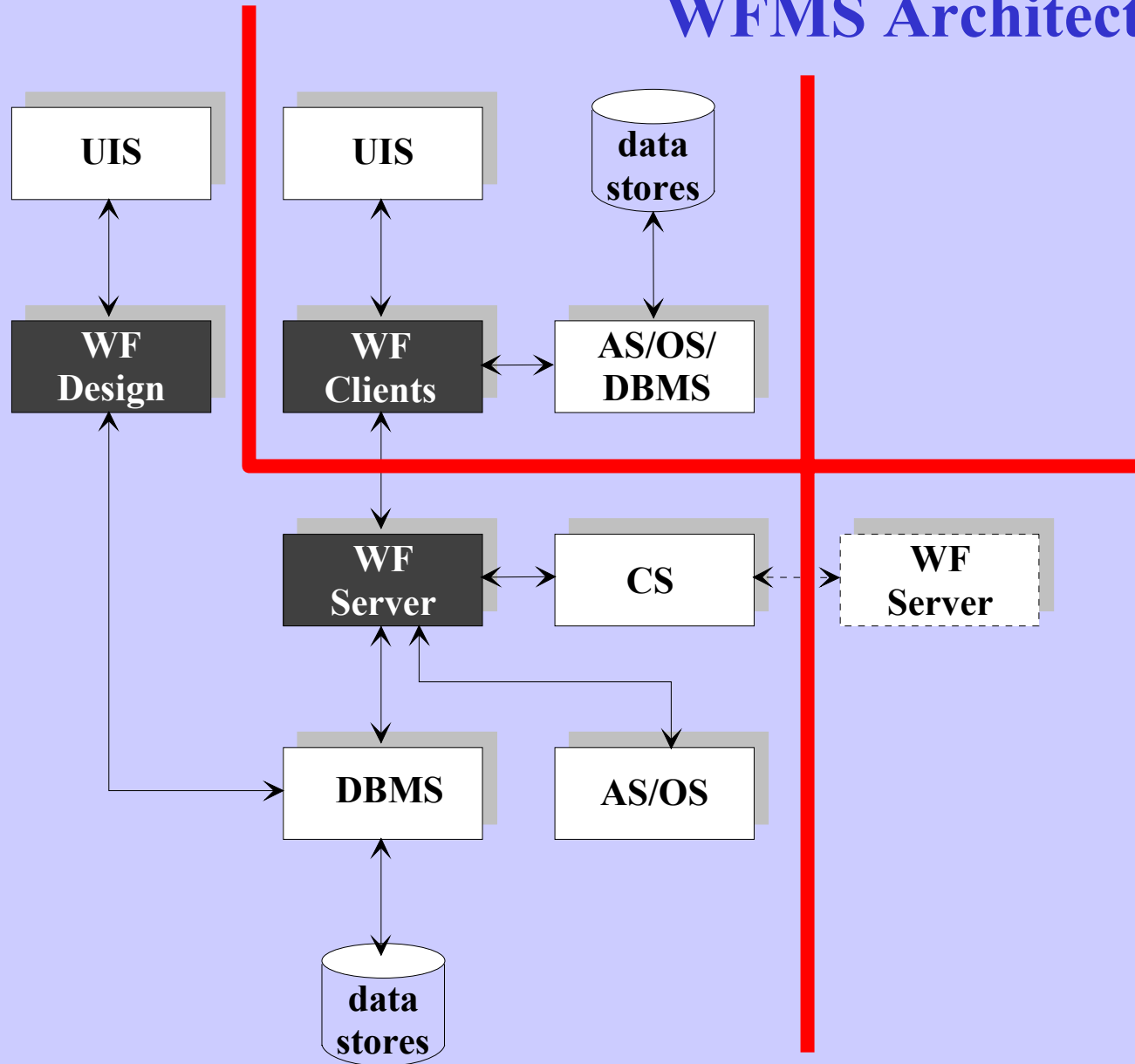
2 parties: 3 possibilities

3 parties: 6 possibilities

4 parties: 4 possibilities

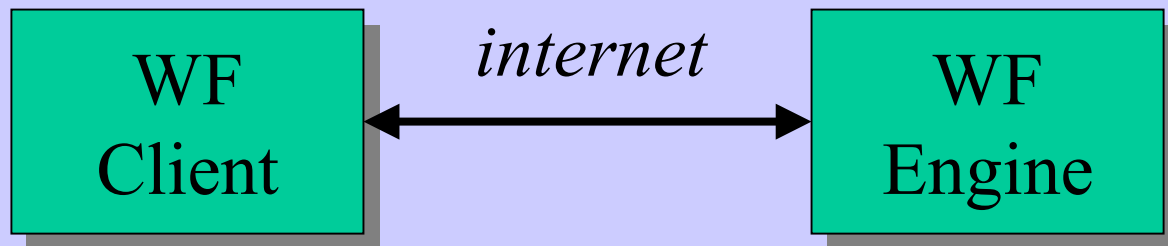
total 13 possibilities

WFMS Architecture



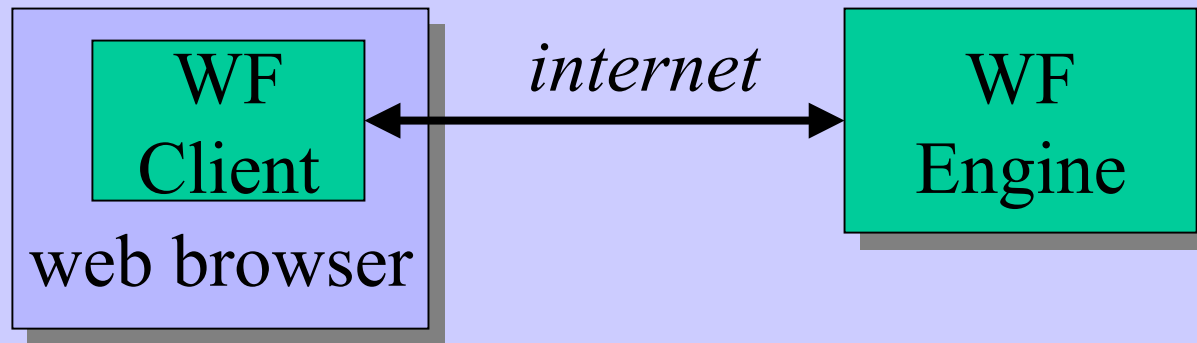
Remote Client Architecture (1)

- Fat client
 - dedicated WF client software
 - arbitrary functionality
 - platform dependent
 - distributed maintenance
 - stable virtual organizations



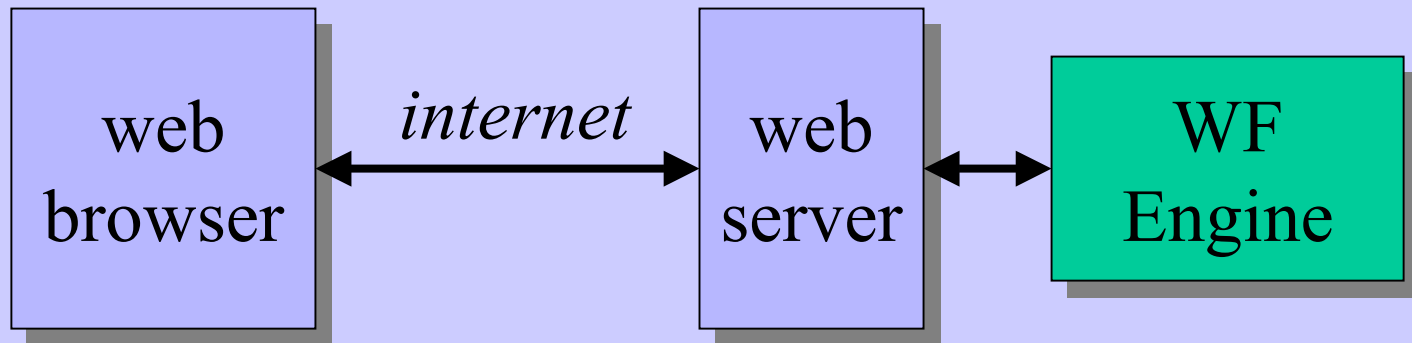
Remote Client Architecture (2)

- Thin client
 - Java applet in web browser
 - functionality limited by Java VM
 - platform independent
 - limited distributed maintenance
 - stable - temporary virtual organizations



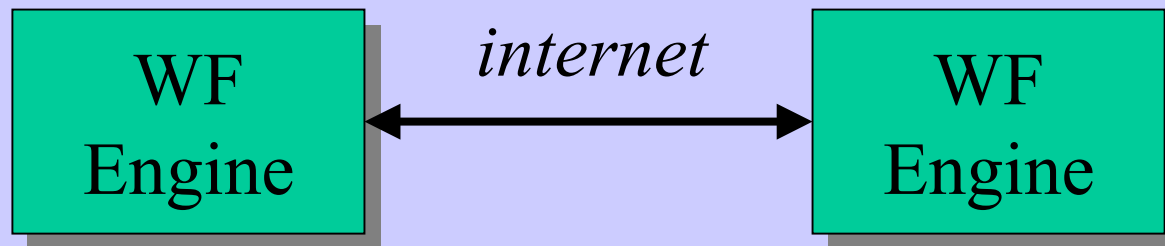
Remote Client Architecture (3)

- Ultrathin client
 - DHTML pages in web browser
 - limited functionality
 - platform independent
 - no distributed maintenance
 - stable virtual organizations - ad hoc use



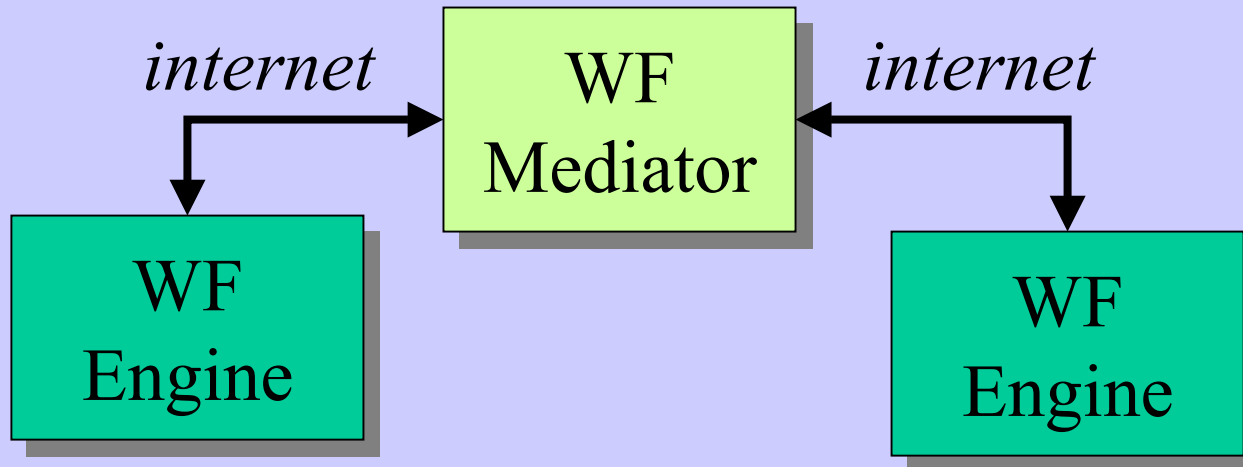
Distributed Server Architecture (1)

- Direct WFE interoperability
 - proprietary interface
 - WfMC IF4
 - remotely defined workflow invocation
 - dynamic remote workflow installation
 - stable virtual organizations



Distributed Server Architecture (2)

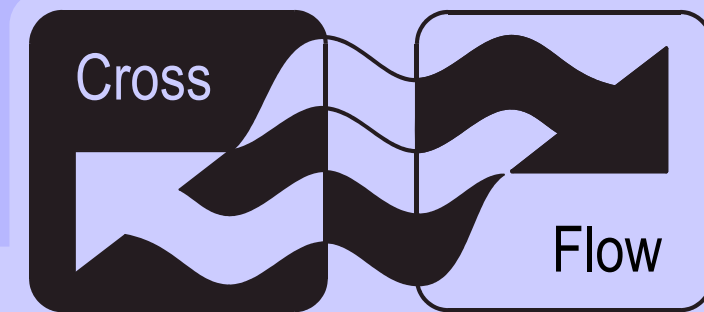
- WFE interoperation via Mediator
 - static connection (connection mediator, e.g., for complex interaction patterns)
 - dynamic connection (workflow broker, for dynamic VEs - CrossFlow approach in Part 2)



- Remote client technology
 - well understood
 - supported by commercial WFMSs
 - centralized process enactment!
- Distributed server technology
 - technology/standards not yet matured
 - unclear interaction model
 - support for homogeneous direct connection
 - heterogeneous direct connection IF4?
 - mediator approach research status

Part 2: CrossFlow

An Approach to Integrating WFM and eCommerce



- CrossFlow context
 - workflow management, electronic commerce
- CrossFlow project
 - $\text{CrossFlow} = \text{WFM} + \text{EC}$
- CrossFlow architecture
 - illustration of technical solution
- Electronic contracts
- Cooperation in CrossFlow
- Status quo of project

CrossFlow Overview: Context and Project

*a brief introduction into
the CrossFlow project*

Workflow Management

- WFM ‘commonplace’ for streamlined intra-organizational process management:
 - structured, standardized processes
 - automated information logistics
 - workload balancing, deadline monitoring
 - management information
- Use in VEs requires support for
 - cross-organizational processes
 - organizational autonomy
 - heterogeneous platforms

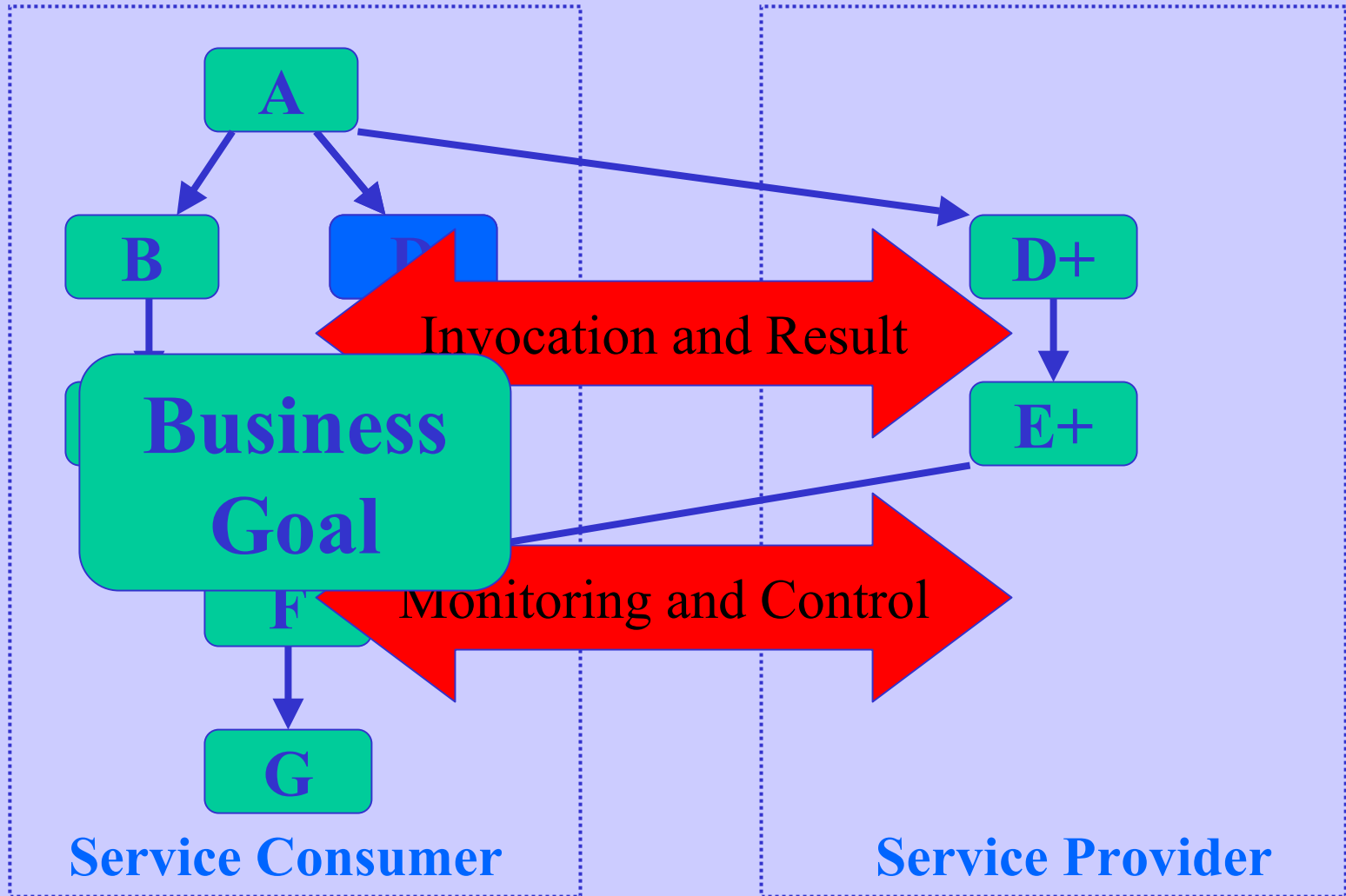
Electronic Commerce

- Electronic trading systems (markets) widespread in electronic commerce
- Focus on trading discrete objects (physical or non-physical) or materials
- Creation of dynamic virtual enterprises requires processes (services) to be traded
 - specification of process structures, process parameters, QoS guarantees, control options
 - standardization of services in specific vertical domains

- Advanced workflow support for dynamic virtual enterprises
 - VEs based on service outsourcing paradigm
 - Outsourced services based on market standards, defined in bilateral electronic contracts
 - Service enactment by WFM in heterogenous environments with organizational autonomy
 - Extensible cooperation support, e.g.:
 - Process monitoring & control
 - Transaction management
 - Flexible process support

CrossFlow Approach

Virtual Organization



CrossFlow Fact Sheet

ESPRIT, 4th Framework, now IST

Planned Turnover ~3 MEuro

Planned Effort ~30 PY

6 Partners + 1 Assoc. + 1 Sub. + 1 Client

Kickoff 22 September 1998 at Böblingen

End 21 September 2000 at Zurich

Goal: WF Support for Dynamic VEs

CrossFlow Consortium

IBM

ZRL

BBL

LGR

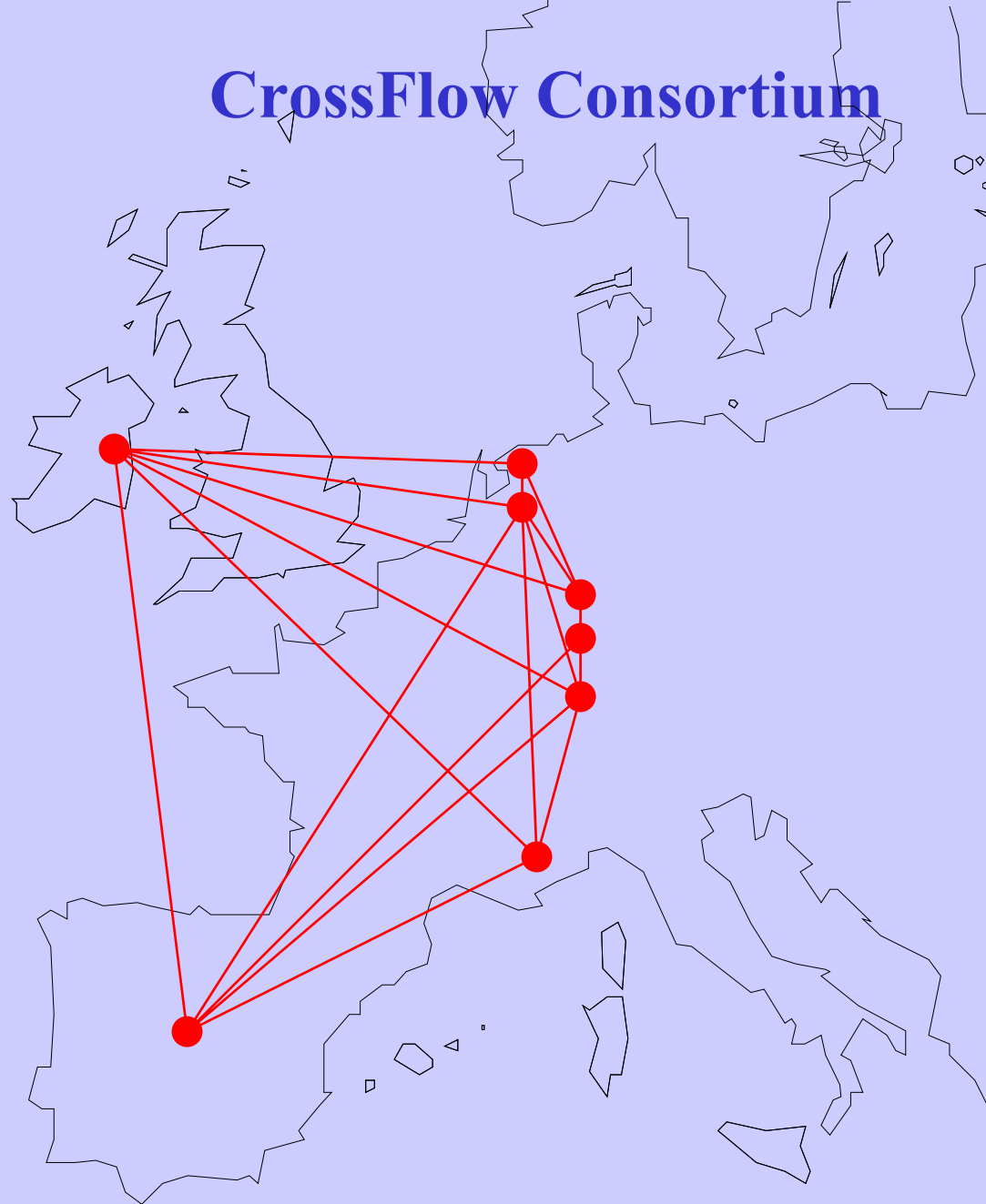
GMD-IPSI

UT

KPN Research

Allianz C&G

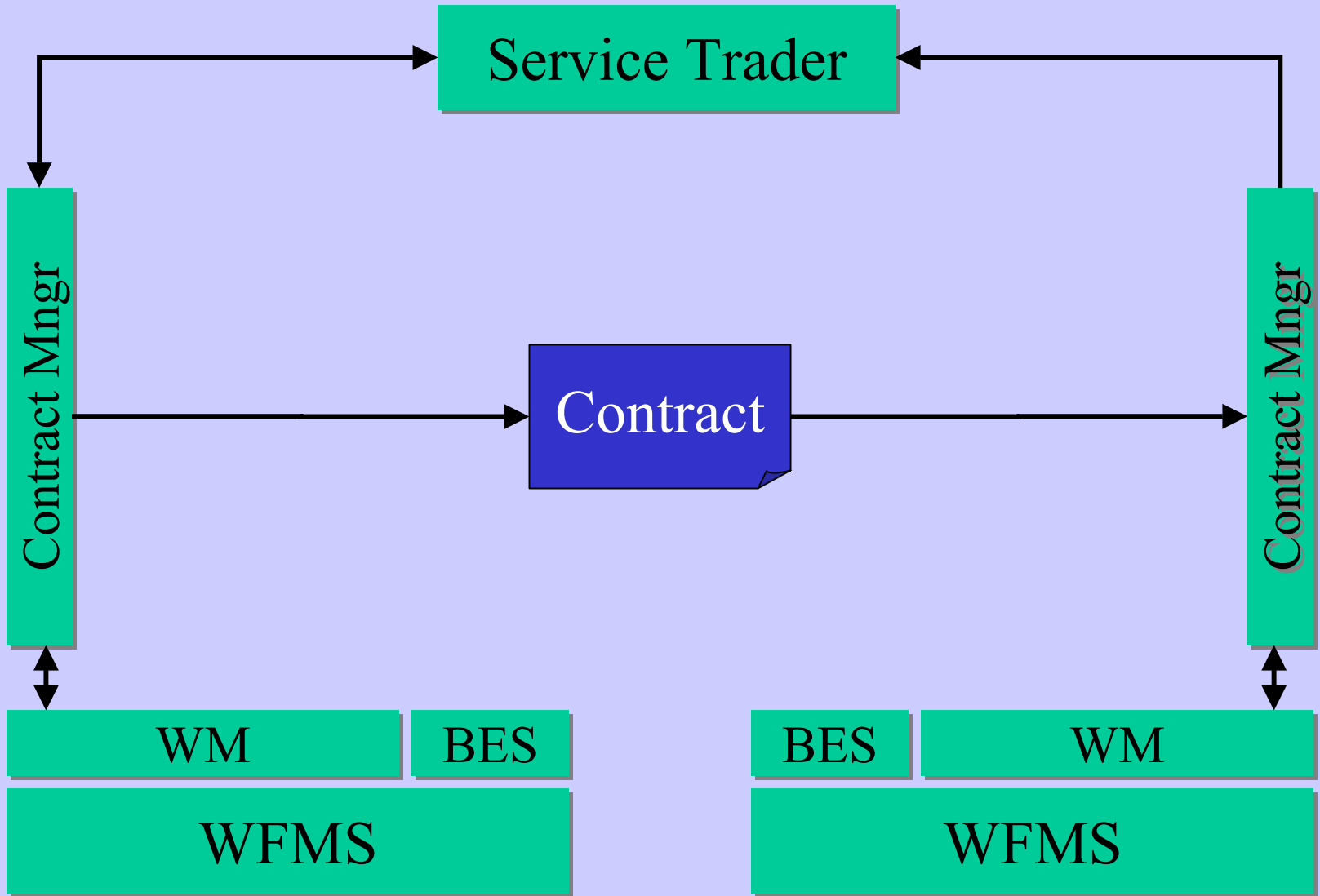
Sema Group



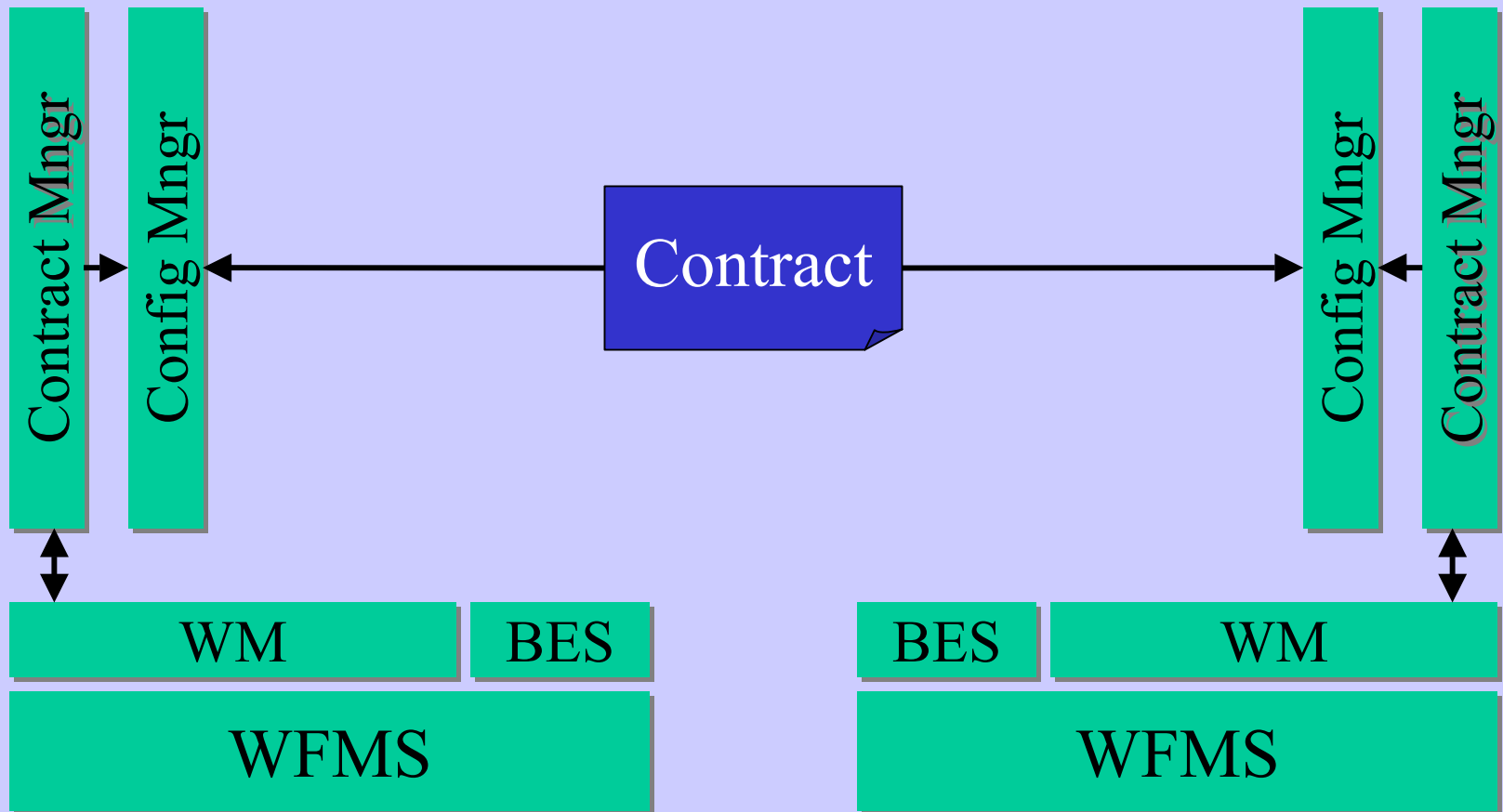
CrossFlow Technology: Architecture & Contracts

*a detailed illustration of
the CrossFlow approach*

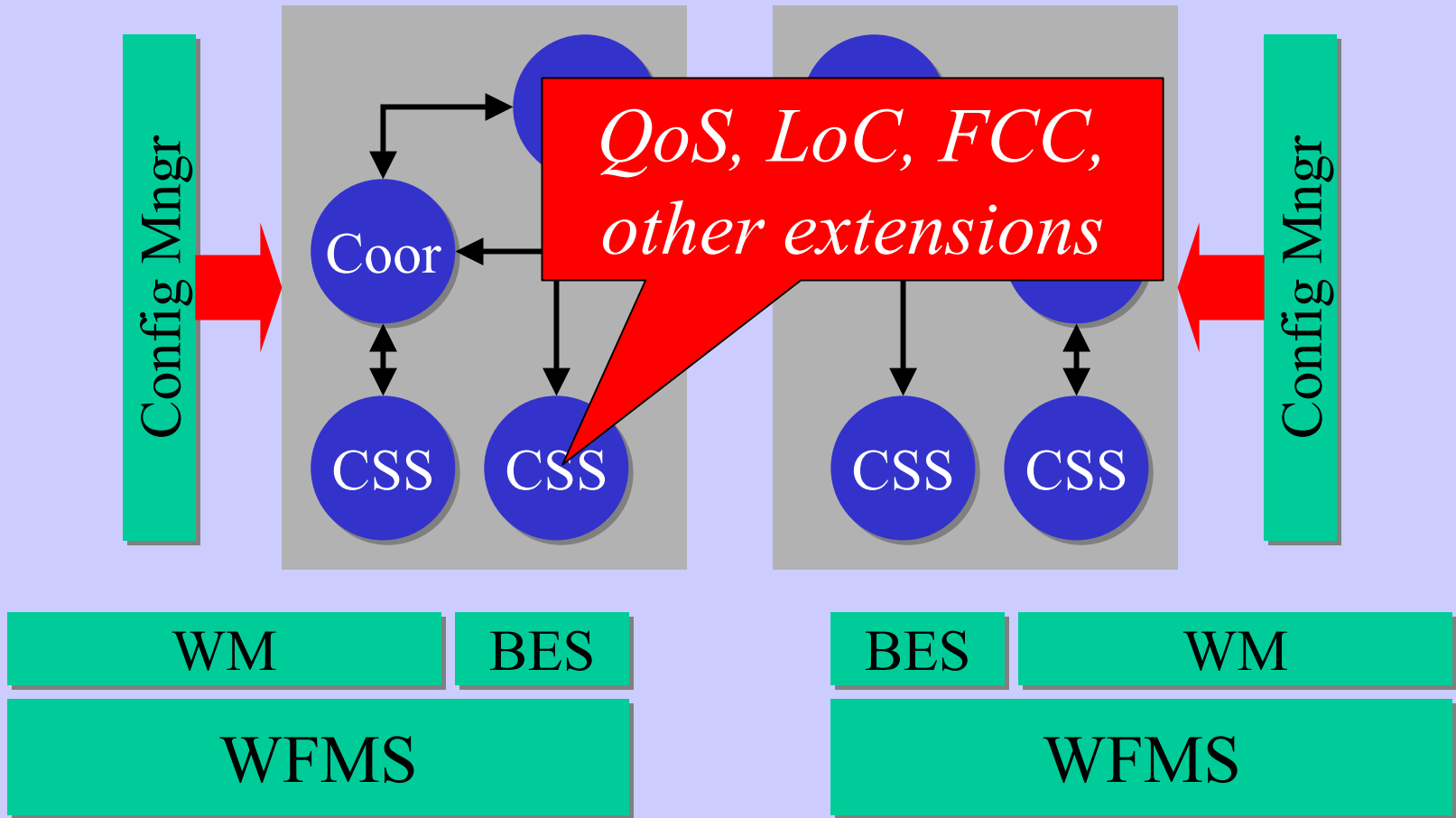
CrossFlow Architecture (Phase 1: EC)



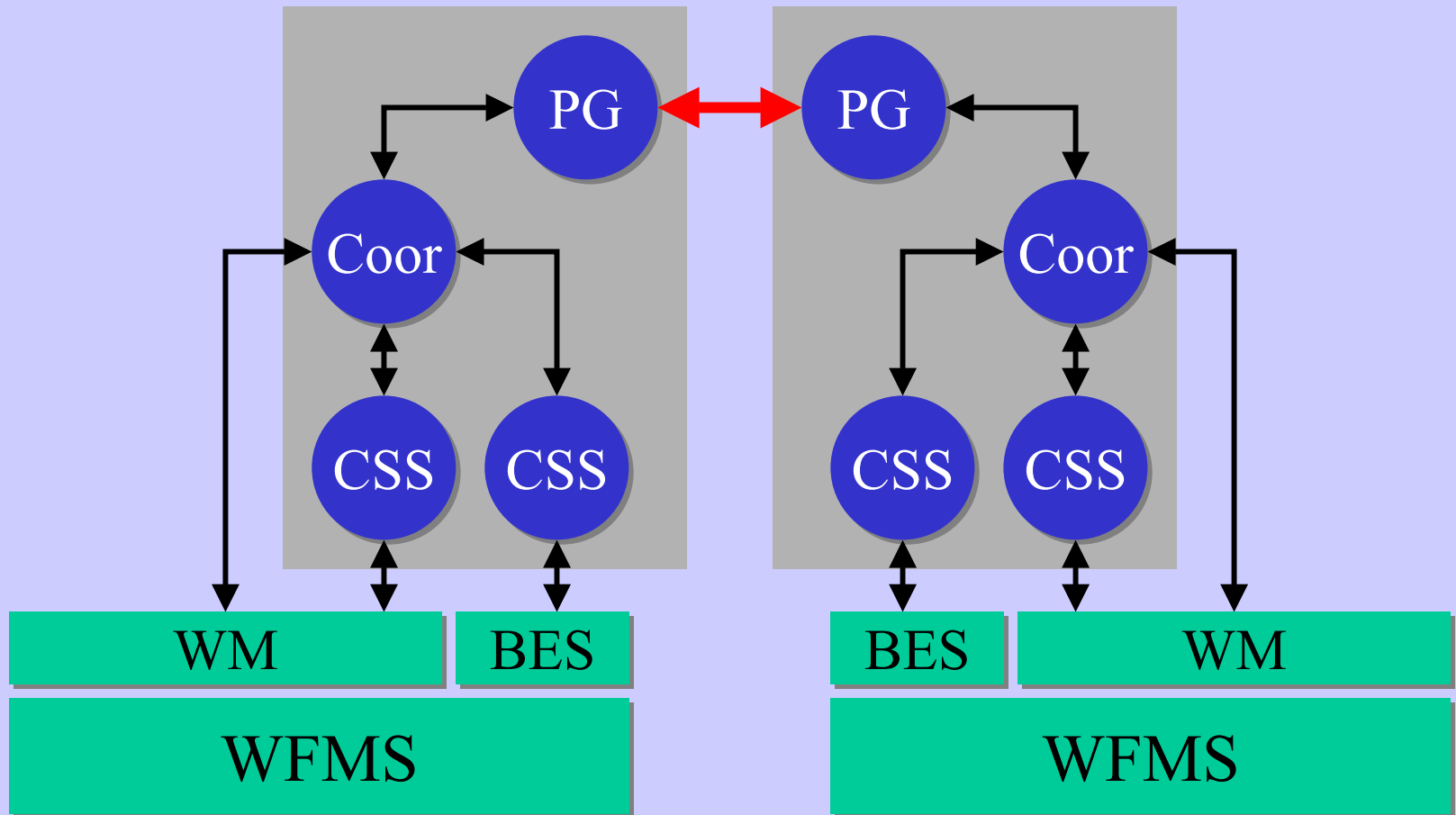
CrossFlow Architecture (Phase 2: Setup)



CrossFlow Architecture (Phase 2: Setup)



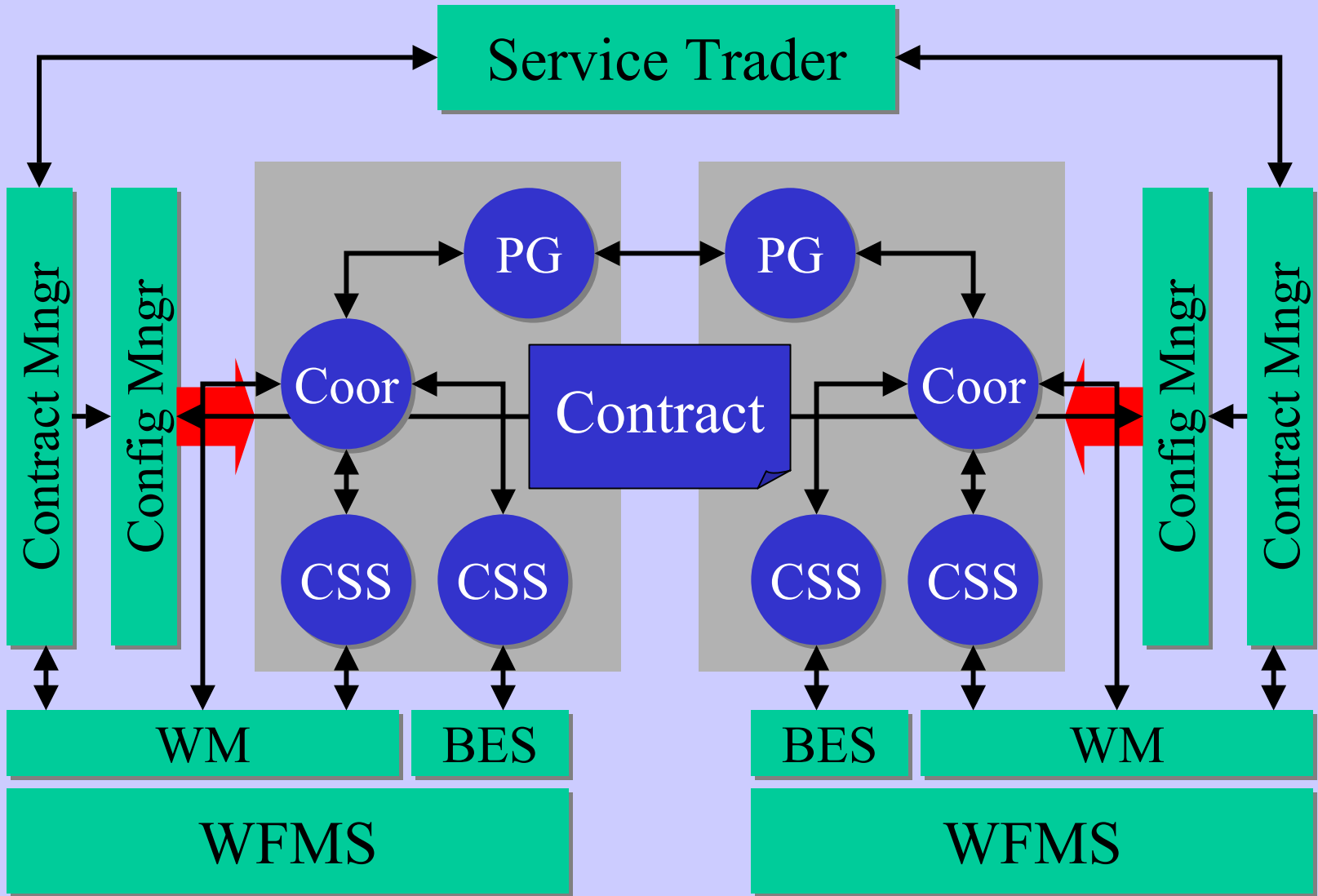
CrossFlow Architecture (Phase 3: **WFM**)



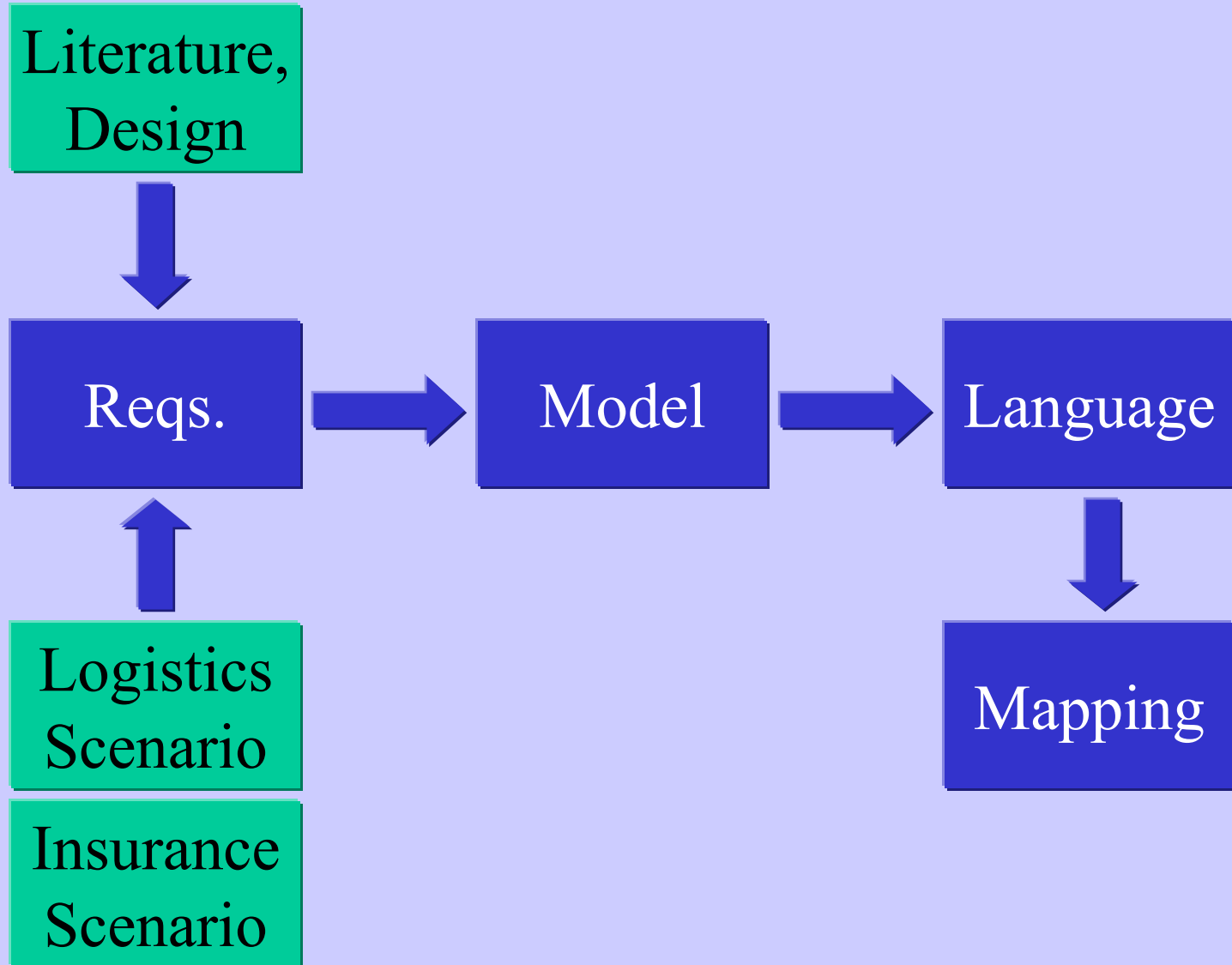
CrossFlow Architecture (Phase 4: Completed)



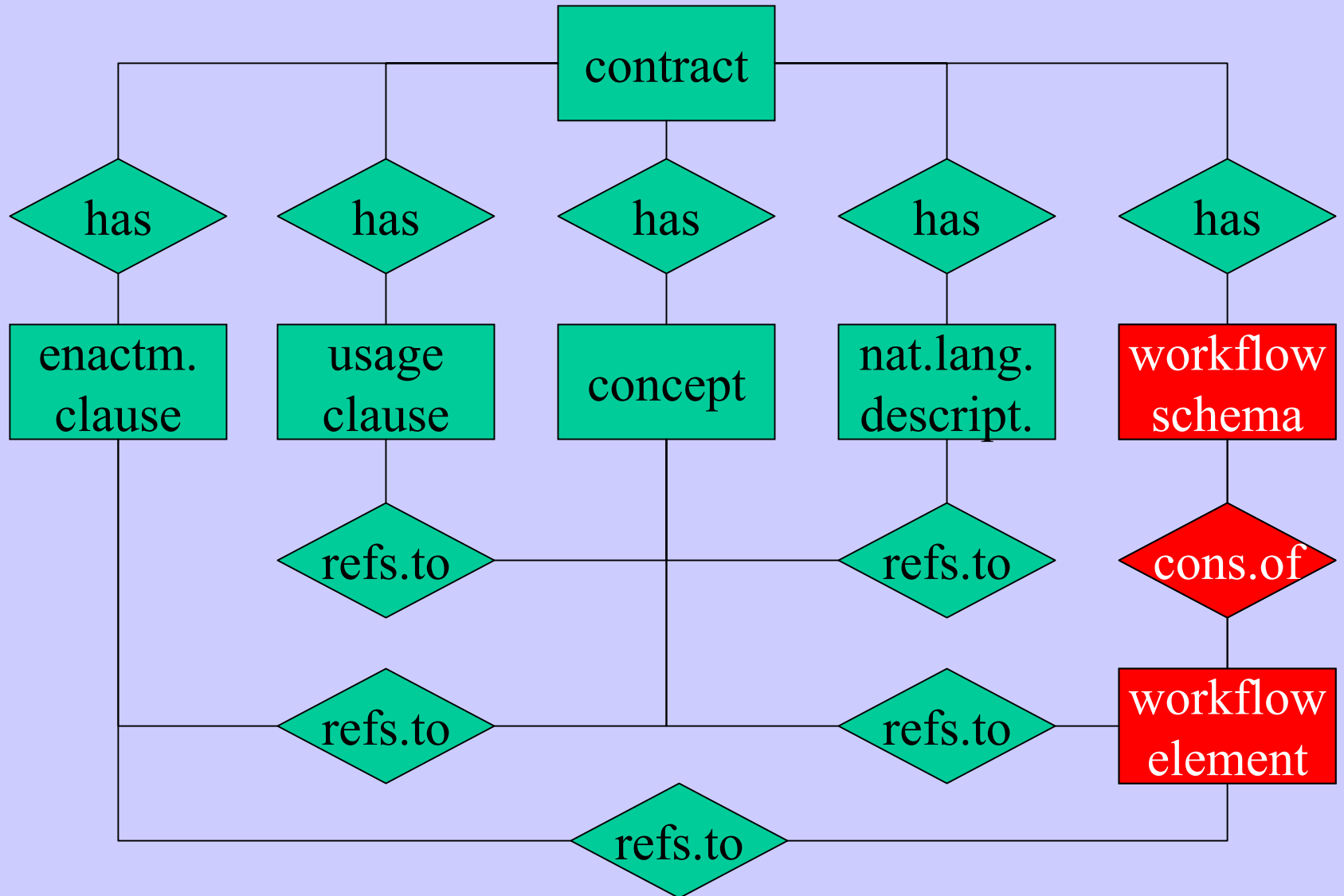
CrossFlow Architecture (revisited)



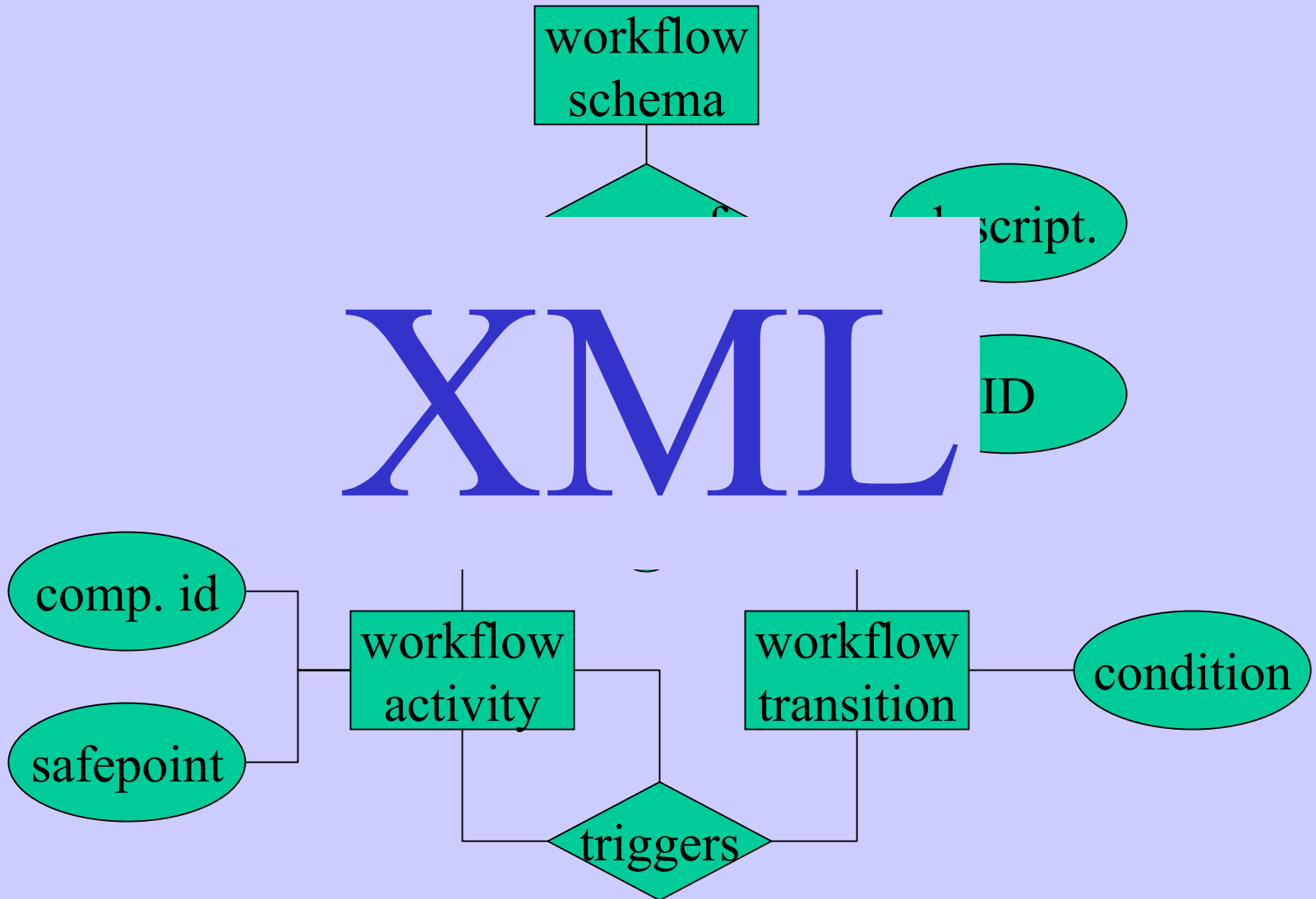
Contract Framework Development



CrossFlow Contract Model



CrossFlow Process Model



Process Model in XML

```
<!ELEMENT Workflow (Activity | Transition )+ >
<!ELEMENT Activity (Name, Description?, Split?, Join?, ExtAttr*)>
<!ATTLIST Activity ActID ID #REQUIRED Performer CDATA #IMPLIED >
<!ELEMENT Split (TransRef*) >
<!ATTLIST Split Type (AND|XOR) "AND">
<!ELEMENT Join EMPTY >
<!ATTLIST Join Type (AND|XOR) "AND">
<!ELEMENT ExtAttr (Name, Type, Value)>
<!ELEMENT Type (#PCDATA) >
<!ELEMENT Value (#PCDATA) >
<!ELEMENT Transition (Name, Description?, To, From, Condition?)>
<!ATTLIST Transition TransID ID #REQUIRED>
<!ELEMENT To (ActRef) >
<!ELEMENT From (ActRef) >
<!ELEMENT Condition (#PCDATA | ParamRef | DataItemRef | ActRef)*>
<!ATTLIST Condition type CDATA #REQUIRED>
<!ELEMENT ActRef EMPTY >
<!ATTLIST ActRef ActID IDREF #REQUIRED>
<!ELEMENT TransRef EMPTY >
<!ATTLIST TransRef TransID IDREF #REQUIRED>
```

Cooperation in the CrossFlow Project

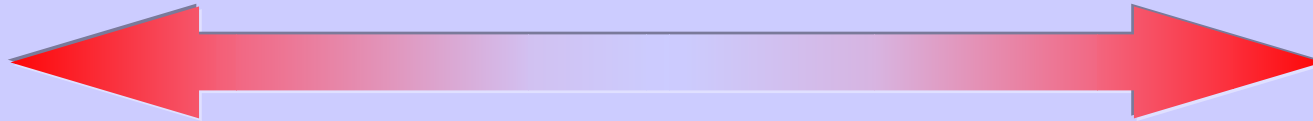
*a short analysis of
working in a consortium*

CrossFlow Architecture (revisited)



- Required fields of expertise:
 - workflow management
 - electronic trading
 - transaction management
 - distributed systems
- Required types of expertise
 - academic models and prototypes
e.g. transaction management subsystem
 - industrial standards and software platforms
e.g. MQSeries Workflow

Cooperation (2)

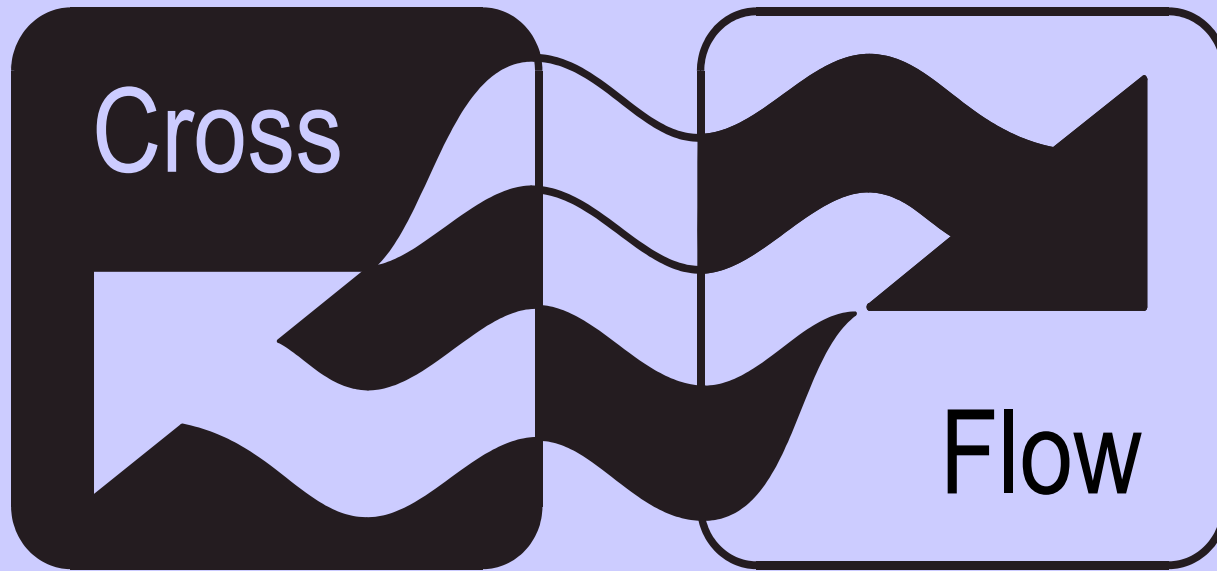


- project in ‘tension field’ between academic ideas and real-world requirements
- can lead to more innovation than ‘pure’ industrial R&D
- can lead to more significance and impact than ‘pure’ academic research
- even more important in fast-paced, multi-aspect areas like e-business

CrossFlow Status Quo

- Concluding symposium Sept. '00 at ZRL
- Integrated prototype software environment
- Application in two demonstrators
 - Logistics scenario (KPN/TNT)
 - Insurance Scenario (ACG)
- Contract model and language
- Scientific publications:
 - RIDE'99, CAiSE'99, IPTW'99, WECWIS'00, CAiSE'00, ISDO'00, EC-Web'00, CoopIS'00, IJCSSE (15) 5

CrossFlow Information



www.crossflow.org