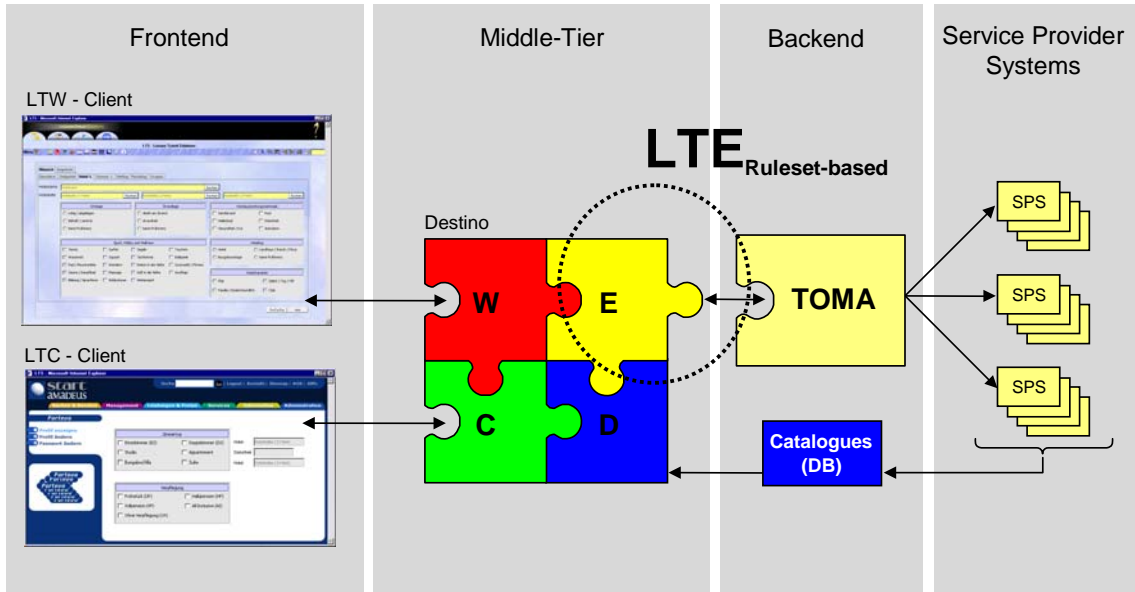


Experiences in usage of ruleset technology

Usage of ruleset technology in J2EE application called Destino for touristic market

**Dr. Harald Kunde
12.05.2005**

Overview on architecture of Destino



Dr. Alois Lechicki on Destino , 31.10.2003

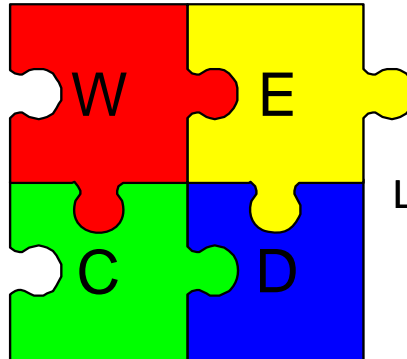
Experiences in usage of ruleset technology

LTW (Workflow)

- Demand analysis
- Processing of dynamic offer queries
- Priority control
- Availability check via LTE

LTC (Control)

- Hierarchical management of control information for control units
- Creation of control related client information



LTE (Engine)

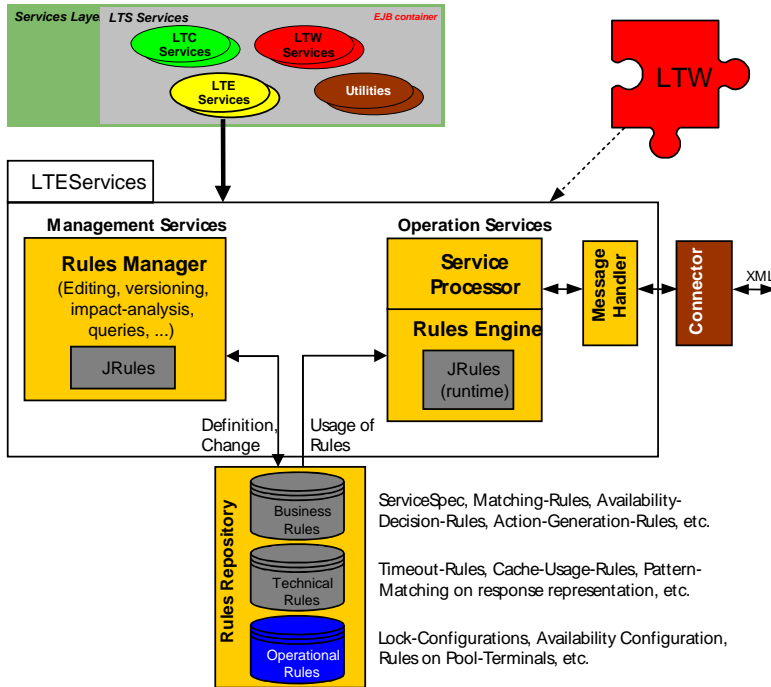
LTD (Database)

- Unified view of SPS specific * data (import)
- Query execution

* SPS ... Service Provider System

Dr. Alois Lechicki, Thomas Kruse on Destino , 31.10.2003

LTE Component Model



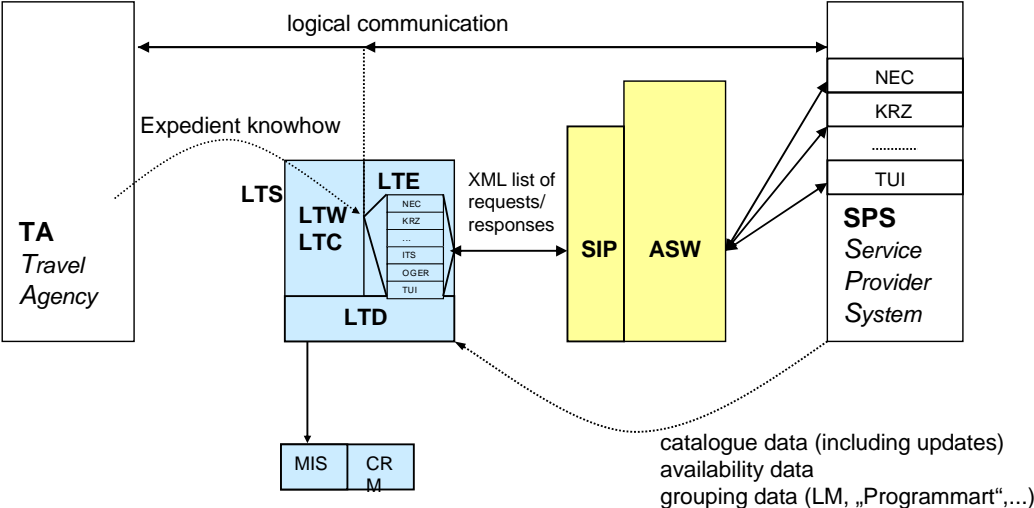
*Dr. Alois Lechicki,
Thomas Kruse on Destino ,
31.10.2003*

LTE: Requirements of high priority

- business logic has to be **externalized** and its rules have to be represented such that **maintainance is possible by business people** (not developpers)
- (Validated) changes on business rules may be **activated at runtime**
- The interface of LTE service must be **abstract**, means, it has to abstract from operation specifics (for instance repetitions of actions in TOMA) and service provider peculiarities. Also responses of service providers have to be compressed into a widely standardized format.
- The number of requests to service provider systems has to be **minimized**.

.....

LTE: Context



the more expedient knowhow is mapped to LTE
the easier communication between expedient and SPS grows
the more complex communication between LTE and SPS grows

LTE: SPS-Model inside

➔ Expedients have a model of Service Provider System behaviour

➔ rules such as

ALL wants to have birthdate instead of age for babies in TOMA BA
ALL wants ANF=V, LEISTUNG=KV for no assurance in TOMA BA
ALL encodes F for catering only breakfast, H for ...
TUI wants P instead of H for ANF to accommodation in TOMA BA
TUI sends flyers on new program types in periods of approximately two weeks

...

➔ experience such as

catalogue data of XY are often incorrect
reservation system of AB is slow and often not available

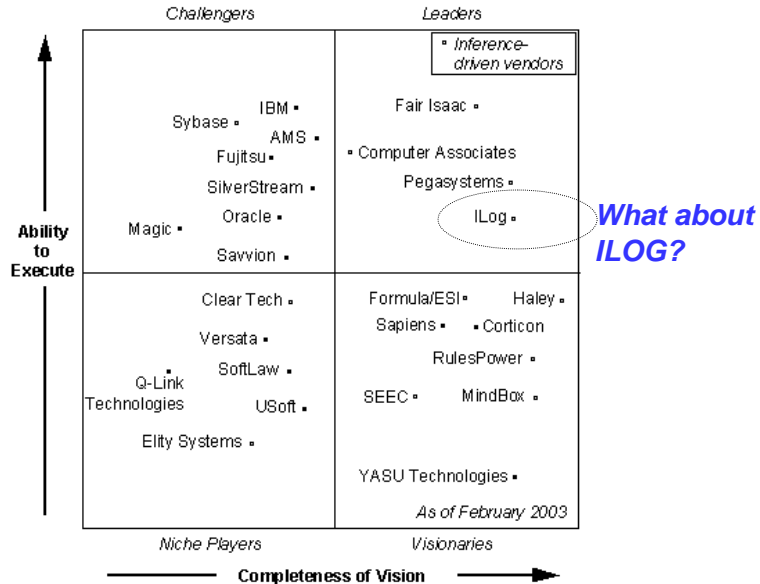
...

↓
integrated in statistics on requests and
information of tour operator on business
risks

}
↓
*Use a
Rulesystem?*

LTE: Use a rule system?

**Gartner April 2003:
The Business Rule
Engine 2003 Magic
Quadrant**



Some facts on ILOG

Foundation: 1987

Headquarters: Gentilly (France)
Mountain View (USA)

Turnover: about 80Mio \$

Employees: about 585 worldwide

Primary business strategy:

components for solution providers
using their sales channels

Products:

ILOG JRules

ILOG Optimization Suite

ILOG Visualization Suite

ILOG JViews for Workflow

ILOG JTGO (network mgmt)

Software alliances

OEM software alliances

Companies that develop and sell software applications integrating ILOG components.

- o [SAP AG](#)
- o [Oracle Corporation](#)
- o [i2 Technologies](#)
- o [Siebel Systems, Inc.](#)
- o [Manugistics Group, Inc.](#)
- o [Nortel Networks Corporation](#)
- o [Hewlett-Packard Company](#)
- o [Dassault Systemes](#)
- o [Other OEM software alliances](#)

Complementary software alliances

Companies that develop and sell software applications complementing ILOG software components.

- o [FileNet Corporation](#)
- o [BEA Systems, Inc.](#)
- o [Sun Microsystems, Inc.](#)
- o [Sybase, Inc.](#)
- o [Fujitsu](#)
- o [IBM WebSphere](#)
- o [MapInfo Corporation](#)
- o [Oracle Corporation](#)
- o [SAP AG](#)
- o [Versata](#)
- o [V4](#)
- o [Vtria](#)

Customers: about 2000 worldwide

Telecommunication

Production

Transports

Financial services

Scope of products:

- Personalization
- Business Intelligence
- **Business Rules**
- network management
- integer, linear, constraint solvers
- rules for rates and billings
- policy management

Features of Rulesystem?



Status end of 2003

On the product JRules

based on **RETE**-algorithm

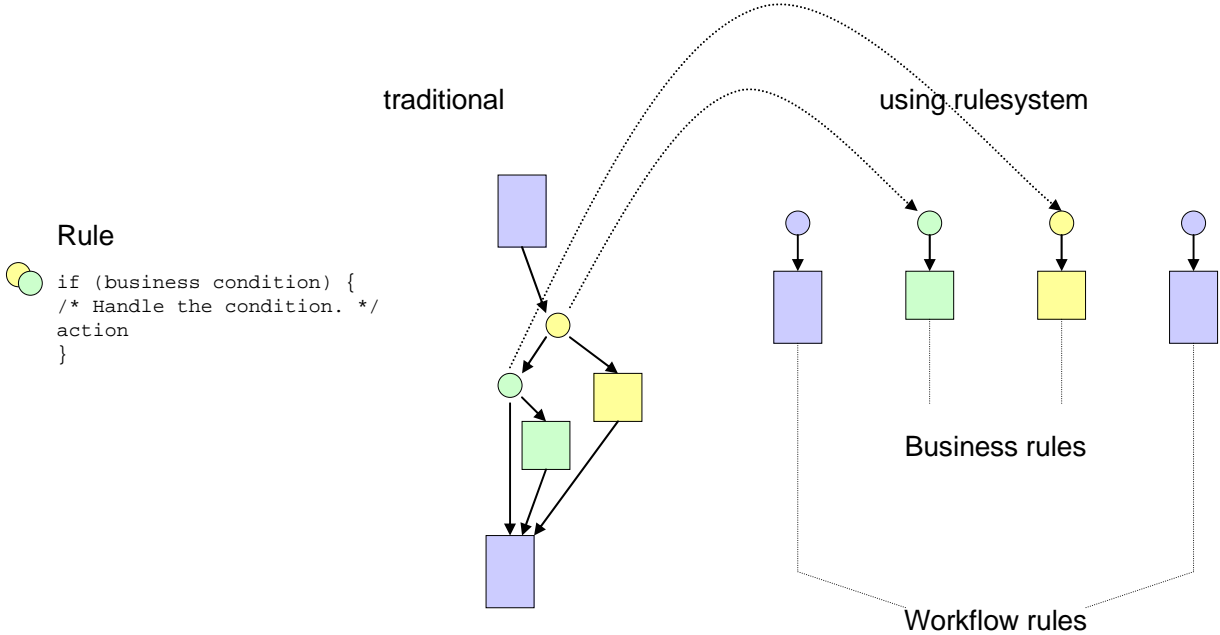
J2EE, XML, Web-Services: may be embedded directly in EJBs
may operate directly on XML without object transformation
may be integrated in Web Services on leading application
server platforms

Repository for rules: independently manageable; based on standards like
MOF (OMG's Meta Object Facility), XMI (OMG'S XML
Metadata Interchange) and JMI (Java Metadata Interface)
supports business rule storage for multiple projects

Rule language flexibility: ***Possibility of defining own rule language***
predefined set of business rule languages that can be used
„out of the box“ or customized

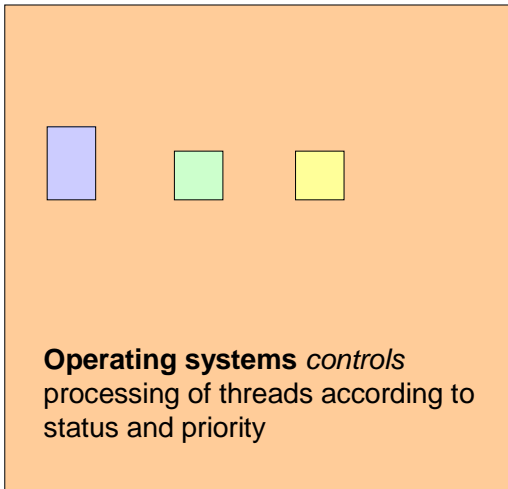
Management-Tools: impact analyzation for rule dependencies, Rules Packaging,
***versioning of rules, tracing, queries on rules,
user-defined rules templates***

Traditional coding versus Rulesystem

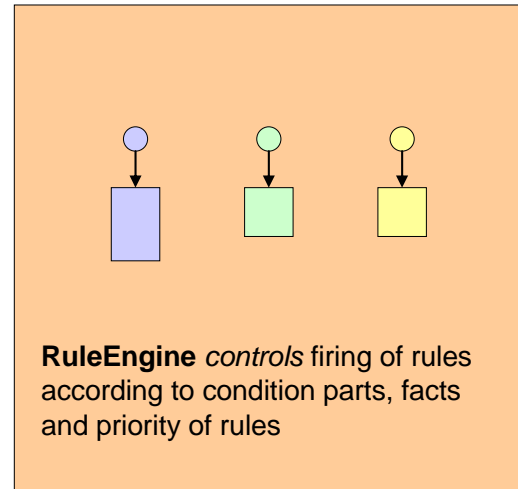


Threading versus Ruleflow

Threading

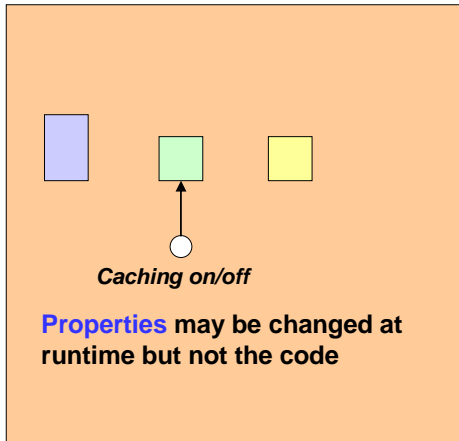


Rule flow

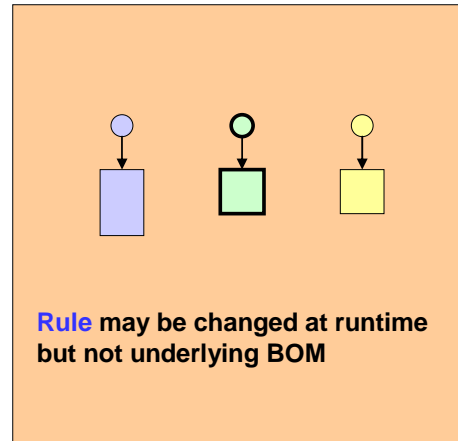


Changes at runtime

Traditional coding using properties

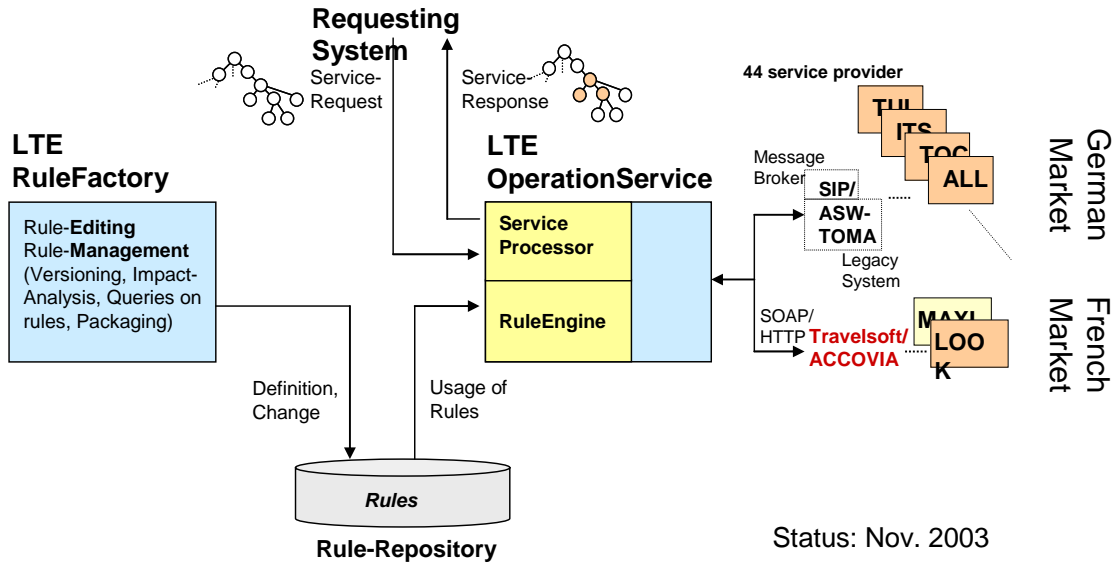


Changing rules at runtime



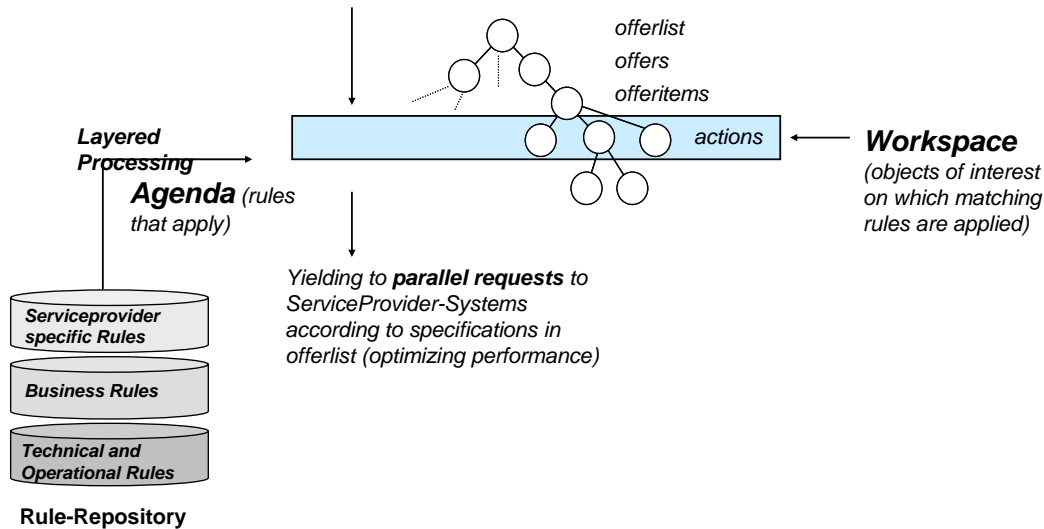
Difference: **Property** has predefined values and **another value is set** to cause different behaviour of application; **rule** condition change **changes** the way **decision** for certain kind of actions is done, even action could be changed to one of predefined actions!

LTE: Primary components

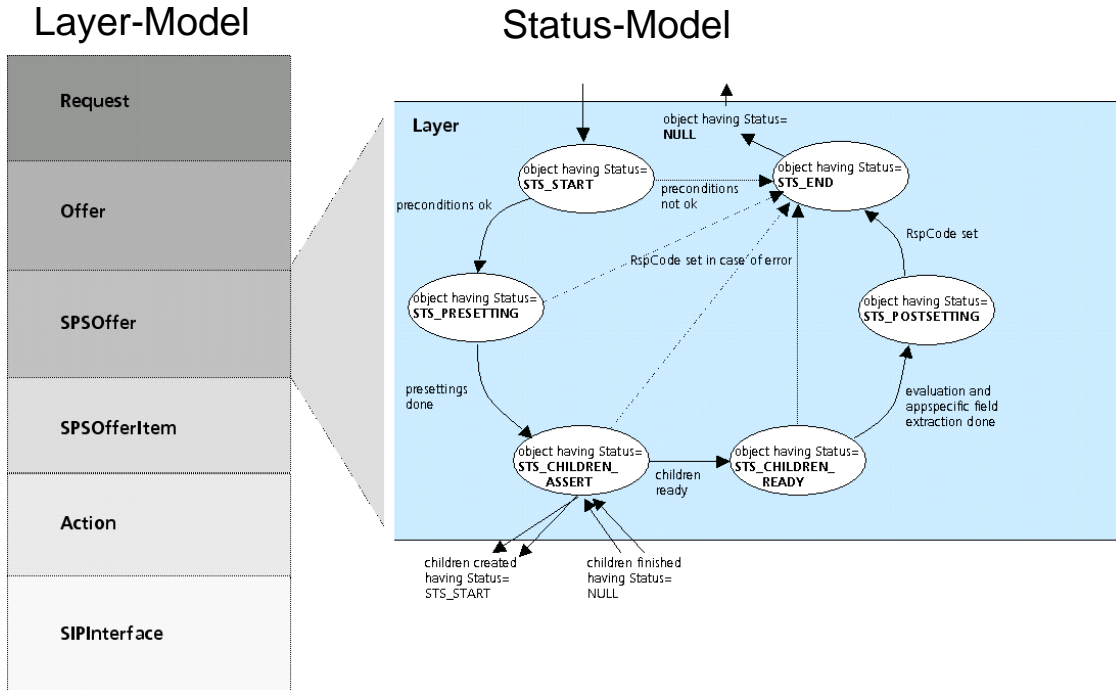


LTE: Processing

- ➔ Main business objects define layers of processing
- ➔ Business object model defines natural order on business rules

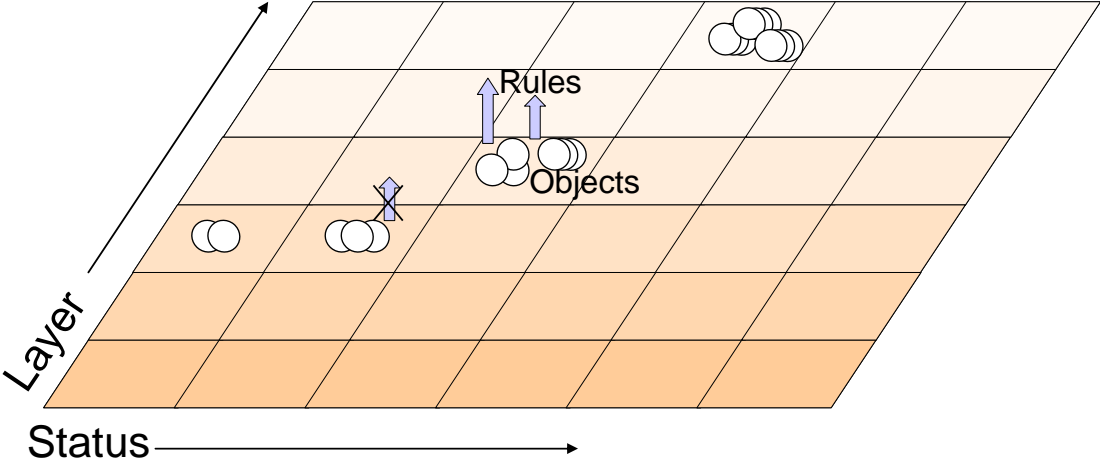


LTE: Workflow model



LTE: Cell based rule flow

The LTE 6x6-matrix



LTE: Example of a technical rule

➔ technical rule:

WHEN

there is a `LayerVc` **called** `?layerVc1`
 such that `getActiveLayer()` = `LayerVc.LayerType.Request`
 there is a `IRequest` **called** `?request1`
 such that `getStatus()` = `Status.STS_END`
 there is a `TraceProvider` **called** `?traceProvider1`
 such that `getTraceCfg()` != null
 and `getTraceCfg().getTraceMode()` > 0
 there is no `TraceDataLog`
 such that `getLayer()` = "Request"
 and `getInOut()` = "O"

THEN

 execute

so that `?traceProvider1.doTrace("Request","O","", "")`

Experiences in usage of ruleset technology

LTE: Business rule template

The screenshot shows the ILOG Rule Builder interface for an LTE rule factory. The main editor displays a business rule template with the following content:

Bedingung
der Status der Vakanzprüfung ist 'unklar'
und der Statuscode ist K998
und die Antwort enthält : <Textbestandteil> als TOMA Meldetext
und der Veranstalter ist : <Wert eingeben>

Aktion
setze den Status der Vakanzprüfung auf 'vakant'

The left sidebar shows a project tree with the following structure:

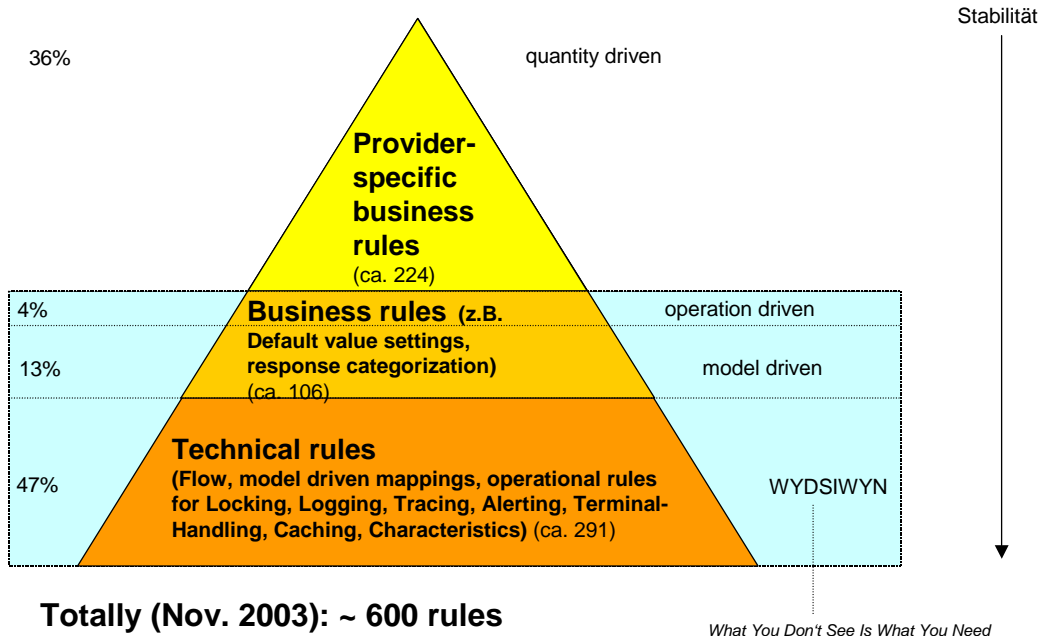
- LTE rule factory
 - ServiceB
 - ServiceGFBA
 - Template library
 - Vorlagen Ablaufkontext
 - Vorlagen TOMA Aktionen
 - Anf- und Leistungscodierung
 - Anforderungscodierung
 - Anrede maennlich
 - Anrede maennlich Veranst-Lis
 - Anrede weiblich
 - Anrede weiblich Veranst-Liste
 - K998 unklar nach nicht vakant
 - K998 unklar nach nicht vakant
 - K998 unklar nach vakant
 - K998 unklar nach vakant Vera
 - Namensangabe
 - Preisreduktion
 - Business Object Model
 - Vorlagen TOMA GF-GZ_2
 - Vorlagen TUI Programmarten
 - Vorlagen Unterbr-Verpfl

The right sidebar shows a properties table for the selected rule:

Name	Value
active	<input checked="" type="checkbox"/>
creationDate	23 Jan 03 08:46:34
currentDefiniti...	Vorlagen TOMA Akt
editable	<input checked="" type="checkbox"/>
lastModificatio...	08 Mai 03 12:57:33
library	Vorlagen TOMA Akt
name	K998 unklar nach v
packet	
priority	4000000

The bottom status bar shows the project name 'K998 unklar nach vakant *' and the 'Engines' tab is selected.

LTE: Rule statistics October 2003



LTE: Rule Runtime Statistics

Model: ~ 50 business classes
with totally ~ 600 attributes

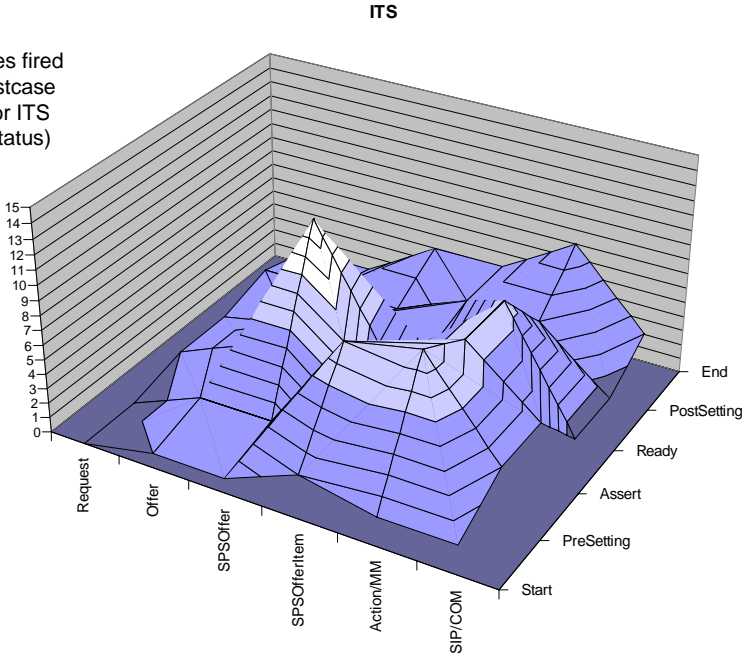
Status end of 2003

Typical RUN*):	classes asserted:	~ 25
	objects on workspace :	~ 400
	rules on agenda :	~ 220
	rules fired:	~ 940
	processing duration:	~ 40 msec _{per Offer}

*) : processing a Request with an OfferFolder containing **10 Offers**
without time tour operator system is consuming

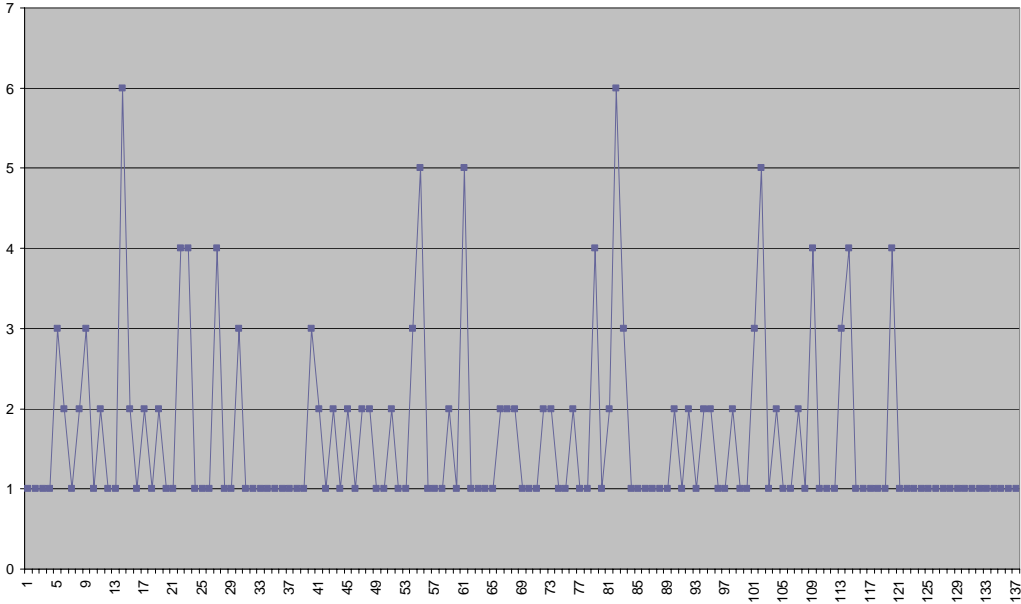
LTE: ITS rule mountain chain

Number of rules fired
for 10-offer-testcase
of tour operator ITS
(6 layers x 6 status)

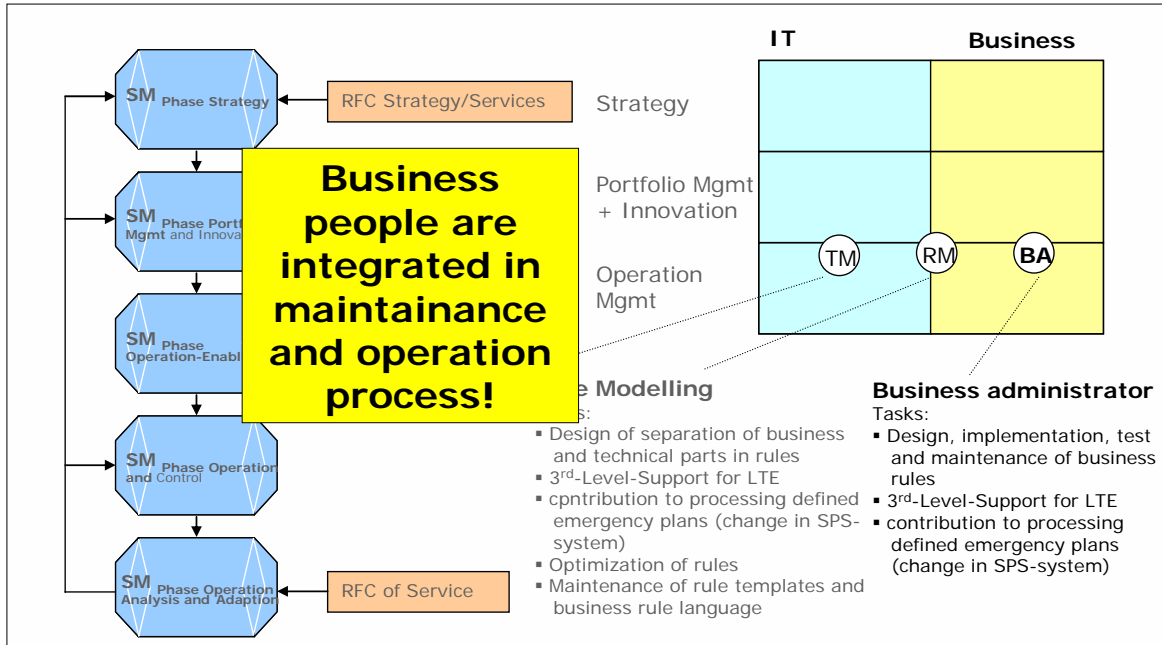


LTE: Concurrency of rules

ITS: concurrent rules



LTE: Processes and roles of particular interest



Summary

- **Advantage of LTE rule system**
 - not every expedient has to learn about complex SPS model
 - automat has to be „filled“ up with rules only once (apart from changes on rules)

- **Disadvantage of LTE rule system**
 - expedient receives interpreted and compressed information

- **Limitations of rule systems (case LTE)**
 - extensive variation in SPS-responses (for instance special hotel-specific infos on availability or restrictions)
 - big enumerations in condition part only by join with tables (for instance in a data base)

- **Hint: Condition parts should easily be evaluated**
Ensure by design that concurrency of rules is small