


Tutorial
Electronic Contracts

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Tutorials
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Agenda

- Contracts
- E-contracts
- Examples
- Challenges
- Q & A
- Break !!
- E-contract Systems
- E-Contracts & Web Services
- Open Research Problems
- Q & A


Contracts

Contract is an agreement between two or more parties, especially one that is written and enforceable by law.

-dictionary.com

Contract is a "promise" or an "agreement" made of a set of promises, the breach of which is recognized by the law and and for which legal remedies can be provided.

-wikipedia.org



Many definitions ....

A contract is a legally enforceable agreement, in which two or more parties commit to certain obligations in return for certain rights [Rei89].

A contract is a statement of intent that regulates behaviour among organizations and individuals. An electronic contract is its reification in software that can be instantiated as a set of obligations that are fulfilled between parties, refused or waived as future events occur.

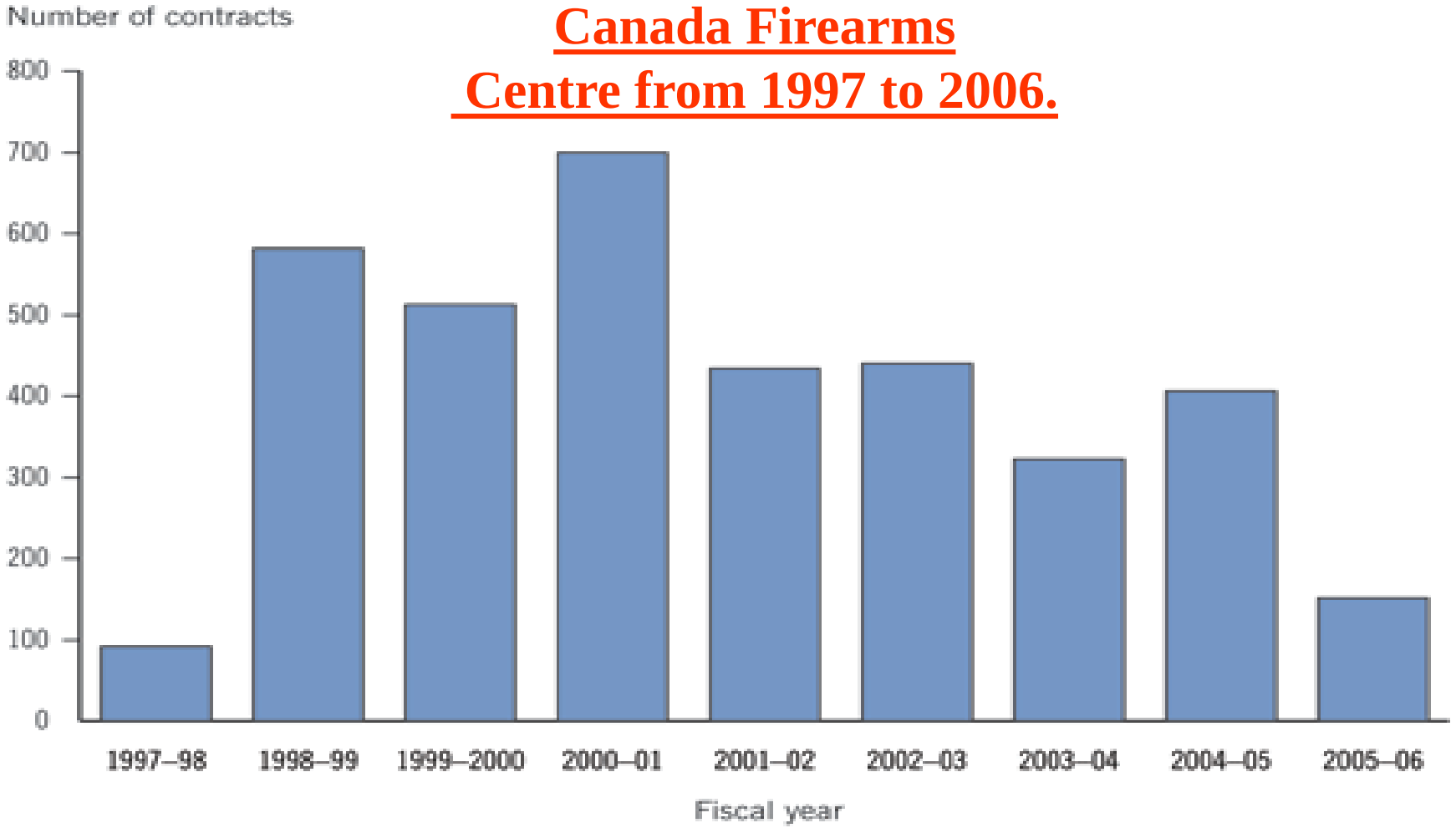
("Towards the Electronic contract" M. Morciniec, C. Bartolini, B. Monahan, M. Salle, HP Labs)

Some Statistics

- In the USA, the federal government spends about USD$200 billion annually buying goods and services from over 300,000 vendors [1997]
- A typical super market chain requires negotiating annually contracts of over 50,000 product items.

- Source: Chiu et al, Decision Support systems 40 (2005) 51-69

Number of contracts awarded each year by the Canada Firearms Centre from 1997 to 2006.



Source:Office of the Auditor General of Canada

No. of Contracts,Value of Contracts Awards in America – July 2006.

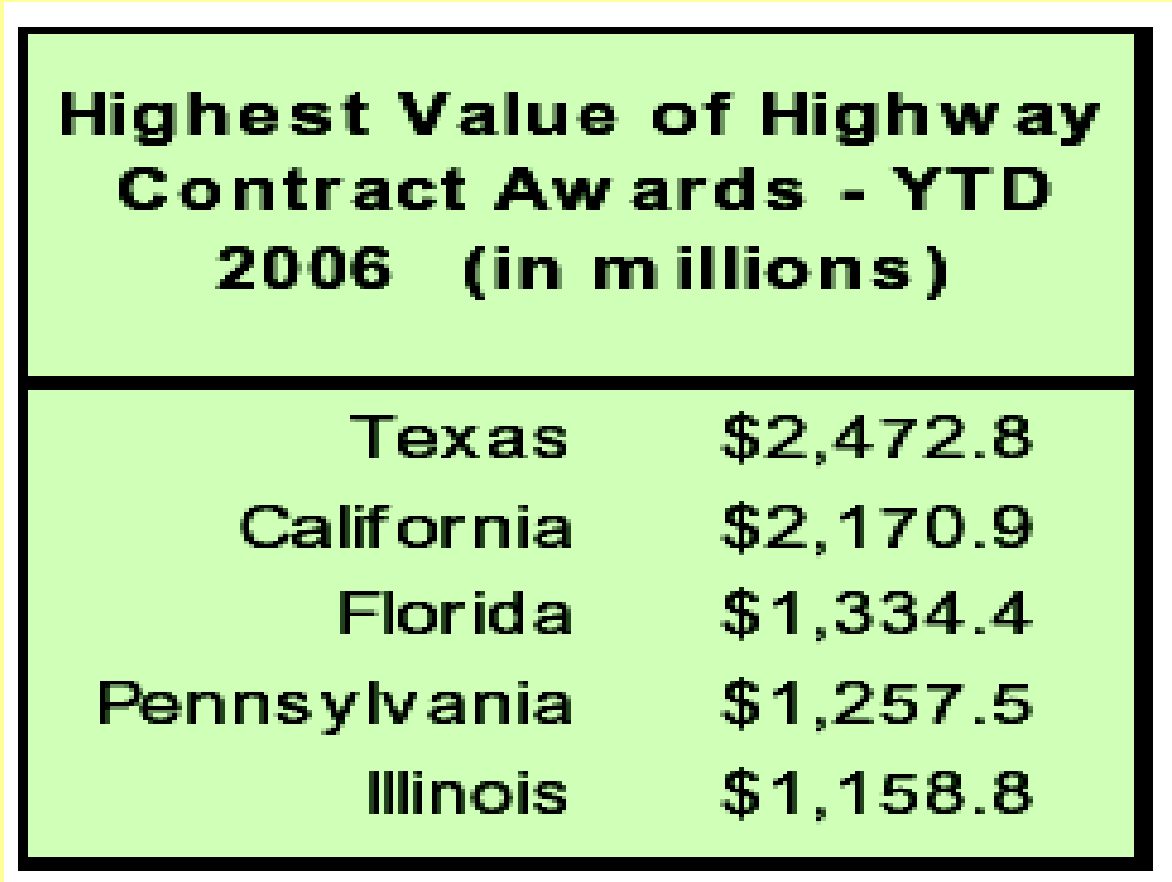
Number of Contracts Awarded						
	Jul-06	Jul-05	% Change	YTD 2006	YTD 2005	% Change
Airport	121	140	-13.6%	476	521	-8.6%
Bridges & Tunnels	443	367	20.7%	2,869	2,601	10.3%
Docks, Piers & Wharves	38	30	26.7%	235	181	29.8%
Highways	2,396	2,640	-9.2%	15,222	14,238	6.9%
Railways	7	11	-36.4%	94	80	17.5%
TOTAL	3,005	3,188	-5.7%	18,896	17,621	7.2%

Source: McGraw-Hill F.W. Dodge Data

Value of Contracts Awarded (in thousands $)						
	Jul-06	Jul-05	% Change	YTD 2006	YTD 2005	% Change
Airport	204,588	248,334	-17.6%	1,286,372	1,137,845	13.1%
Bridges & Tunnels	933,384	934,350	-0.1%	6,998,245	6,836,938	2.4%
Docks, Piers & Wharves	69,380	38,499	80.2%	376,955	570,145	-33.9%
Highways	3,247,530	3,275,679	-0.9%	23,023,855	19,801,114	16.3%
Railways	18,903	62,651	-69.8%	533,323	1,247,725	-57.3%
TOTAL	4,473,785	4,559,513	-1.9%	32,218,750	29,593,767	8.9%

Source:American Road and Transportation Builders Association(ATBA)

Highest Value of Highway Contracts Awards – YTD 2006 (in millions).



Source:American Road and Transportation Builders Association(ATBA)

290321 4/4 325668 Q04001389

ICICI LIMITED

ICICI Safety Bonds FEBRUARY 2002

(Incorporated on January 5, 1955 as a Public Limited Company under the Indian Companies Act, VII of 1913)

Registered Office : ICICI Towers, Bandra-Kurla Complex, Mumbai 400 051.

UNSECURED REDEEMABLE BOND(S) IN THE NATURE OF DEBENTURE(S)

TAX SAVING BOND-022002-TSB- ONE

OPTION	FACE VALUE PER BOND (Rs.)	ISSUE PRICE PER BOND (Rs.)	DEEMED DATE OF ALLOTMENT	REDEMPTION DATE	INTEREST RATE	TAX BENEFIT U/S
I						

Issue of Unsecured Redeemable Tax Saving Bonds in the nature of Debentures of face value as indicated above (the "Bond(s)") out of the total issue of Unsecured Redeemable Bonds in the nature of Debentures aggregating Rs. 600 crore with a right to retain oversubscription up to Rs. 600 crore comprising Tax Saving Bonds, Encash Bonds, Monthly Income Bond, Regular Income Bonds, Money Multiplier Bonds and Children Growth Bonds (the "Issue") made under the authority of the Memorandum and Articles of Association of the Company, Resolution passed by the Board of Directors at their meeting held on July 28, 1997 and January 29, 1999 and in terms of the Prospectus dated January 29, 2002

The proceeds from these Bonds shall be deployed towards infrastructure projects in accordance with the Income-tax rules.

In case of Option I and II, interest on the Face Value of Bond(s) will be paid at the rate mentioned herein above, on May 1 each year (subject to deduction of tax at source at the rates prevailing from time to time under the provisions of the Income tax Act, 1961 or any statutory notification or re-enactment thereof), and on redemption thereof, provided that, the first interest payment will be made onMay 1, 2003 for the period commencing from the Deemed Date of Allotment and the last interest payment will be made at the time of Redemption of the Bond on a pro-rata basis.

The Bond(s) is/are subject to the terms and conditions and the benefits endorsed herein, in the Prospectus dated January 29, 2002 and the Trustee Agreement to be entered into between the Company and the Western India Trustee and Executor Company as Trustees (the "Trustees") which shall be binding on the Company, holders of the Bond(s) (the "Bondholder(s)"), the Trustees and all persons claiming by, through or under any of them. All rights and remedies of the Bondholder(s) against the Company in respect of, arising out of or incidental to the Bond(s) shall be exercisable by the Bondholder(s) only through the Trustees.

This is to certify that the person(s) named below or the last Transferee(s) whose name(s) is/are duly recorded in the Memorandum of Transfers on the reverse hereof is/are the holder(s) of the withinmentioned Bond(s) subject to the Memorandum and Articles of Association of the Company and the terms and conditions set out herein, which are deemed to be forming a part hereof for all purposes and to all intents.

Bondholder No. **Certificate No.**

Name(s) of Bondholder(s)

TAX SAVING BOND

No. of Bond(s) ONE **** 1 ****

Distinctive No(s).

Given at Mumbai this

For and on behalf of **ICICI LIMITED**

DEPOSITORY ISIN:

Director Director

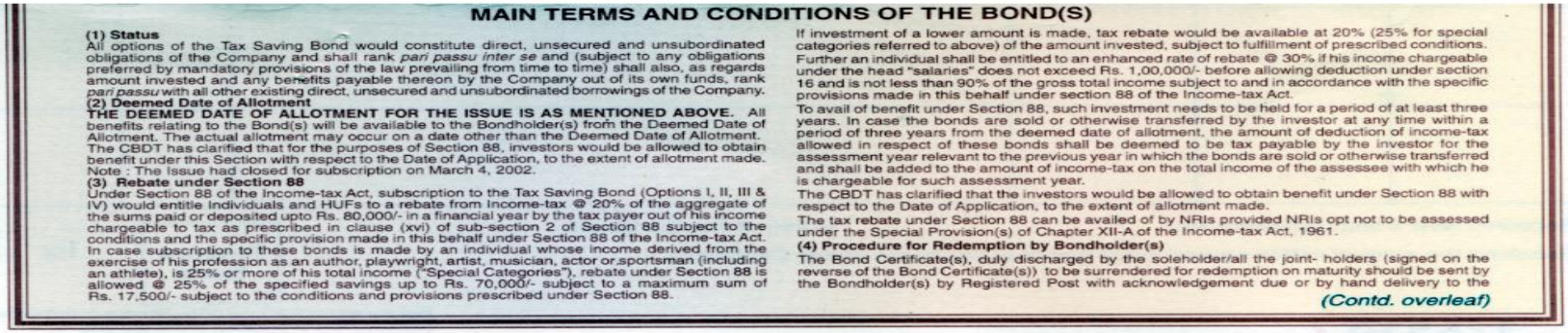
CONSOLIDATED STAMP DUTY PAID VIDE ORDER DATED ISSUED BY GOVT. OF INDIA, MINISTRY OF FINANCE, DEPARTMENT OF REVENUE.

Authorized Signatory

THE CENTRAL BOARD OF DIRECT TAXES (CBDT) HAS VIDE LETTER NO. F. NO. 178/19/2001-IT(AI) DATED JUNE 14, 2001 DECLARED THE TAX SAVING BOND AS ELIGIBLE SECURITY FOR THE PURPOSE OF SECTION 88(2)(xvi) OF THE INCOME-TAX ACT, 1961. THE PROCEEDS FROM THIS BOND SHALL BE DEPLOYED TOWARDS INFRASTRUCTURE PROJECTS IN ACCORDANCE WITH THE INCOME-TAX RULES. THE TAX EXEMPTION CAN BE AVAILED OF BY NRIs PROVIDED NRIs OPT NOT TO BE ASSESSED UNDER THE SPECIAL PROVISION(S) OF CHAPTER XII-A OF THE INCOME-TAX ACT, 1961.

SCRIP CODE	BSE :	NSE :

Bondholders should confirm the scrip codes of the bonds with the brokers before dealing in them.



MAIN TERMS AND CONDITIONS OF THE BOND(S)

(1) Status
All options of the Tax Saving Bond would constitute direct, unsecured and unsubordinated obligations of the Company and shall rank *pari passu inter se* and (subject to any obligations preferred by mandatory provisions of the law prevailing from time to time) shall also, as regards amount invested and any benefits payable thereon by the Company out of its own funds, rank *pari passu* with all other existing direct, unsecured and unsubordinated borrowings of the Company.

(2) Deemed Date of Allotment
THE DEEMED DATE OF ALLOTMENT FOR THE ISSUE IS AS MENTIONED ABOVE. All benefits relating to the Bond(s) will be available to the Bondholder(s) from the Deemed Date of Allotment. The actual allotment may occur on a date other than the Deemed Date of Allotment. The CBDT has clarified that for the purposes of Section 88, investors would be allowed to obtain benefit under this Section with respect to the Date of Application, to the extent of allotment made.
Note : The Issue had closed for subscription on March 4, 2002.

(3) Rebate under Section 88
Under Section 88 of the Income-tax Act, subscription to the Tax Saving Bond (Options I, II, III & IV) would entitle Individuals and HUFs to a rebate from Income-tax @ 20% of the aggregate of the sums paid or deposited upto Rs. 80,000/- in a financial year by the tax payer out of his income chargeable to tax as prescribed in clause (xvi) of sub-section 2 of Section 88 subject to the conditions and the specific provision made in this behalf under Section 88 of the Income-tax Act. In case subscription to these bonds is made by an individual whose income derived from the exercise of his profession as an author, playwright, artist, musician, actor or sportsman (including an athlete), is 25% or more of his total income ("Special Categories"), rebate under Section 88 is allowed @ 25% of the specified savings up to Rs. 70,000/- subject to a maximum sum of Rs. 17,500/- subject to the conditions and provisions prescribed under Section 88.

If investment of a lower amount is made, tax rebate would be available at 20% (25% for special categories referred to above) of the amount invested, subject to fulfillment of prescribed conditions.
Further an individual shall be entitled to an enhanced rate of rebate @ 30% if his income chargeable under the head "salaries" does not exceed Rs. 1,00,000/- before allowing deduction under section 16 and is not less than 90% of the gross total income subject to and in accordance with the specific provisions made in this behalf under section 88 of the Income-tax Act.
To avail of benefit under Section 88, such investment needs to be held for a period of at least three years. In case the bonds are sold or otherwise transferred by the investor at any time within a period of three years from the deemed date of allotment, the amount of deduction of income-tax allowed in respect of these bonds shall be deemed to be tax payable by the investor for the assessment year relevant to the previous year in which the bonds are sold or otherwise transferred and shall be added to the amount of income-tax on the total income of the assessee with which he is chargeable for such assessment year.
The CBDT has clarified that the investors would be allowed to obtain benefit under Section 88 with respect to the Date of Application, to the extent of allotment made.
The tax rebate under Section 88 can be availed of by NRIs provided NRIs opt not to be assessed under the Special Provision(s) of Chapter XII-A of the Income-tax Act, 1961.

(4) Procedure for Redemption by Bondholder(s)
The Bond Certificate(s), duly discharged by the soleholder/all the joint- holders (signed on the reverse of the Bond Certificate(s)) to be surrendered for redemption on maturity should be sent by the Bondholder(s) by Registered Post with acknowledgement due or by hand delivery to the

(Contd. overleaf)

jai kaushal-Mumbai

(Contd. from reverse)

office of the Company/ICICI Infotech Services Limited (ICICI Infotech) or to such persons at such addresses as may be notified by the Company from time to time. Bondholder(s) are requested to surrender the Bond Certificate(s) in the manner as stated above, not more than three months and not less than one month prior to the Redemption Date so as to facilitate timely payment. (Also see para on "Payment on Redemption" given below).

(5) Payment on Redemption
Despatch of cheque/pay order, etc. in respect of payment on redemption of the Bond(s) will be made only on the surrender of Bond Certificate(s), duly discharged by the sole holder/all the jointholders (signed on the reverse of the Bond Certificate(s)). Despatch of cheque/pay order etc. in respect of such payment will be made on Redemption Date or within a period of 30 days from the date of receipt of the duly discharged Bond Certificate(s), whichever is later.
For the Bonds held in Demat form, no action is required on the part of the investor at the time of Redemption. On the date of maturity, the Redemption proceeds would be paid by cheque/pay order, etc. to the eligible Bondholder(s) and the Bonds will be simultaneously extinguished by the Company.
ICICI may, at its discretion, redeem the bonds without the requirement of surrendering of the bond certificates by the bondholder(s). In case the Company decides to do so, the redemption proceeds in the manner stated above would be paid on the redemption date to those bondholders whose names stand in the register of bondholders maintained by the Company on the Record date fixed for the purpose of Redemption. Hence the transferees, if any, should ensure lodgement of the transfer documents with the Company before the Record Date. In case the transfer documents are not lodged with the Company before the Record Date and the Company despatches the redemption proceeds to the transferor, claims in respect of the redemption proceeds should be settled amongst the parties inter se and no claim or action shall lie against the Company or ICICI Infotech/the Registrars.
The redemption amount will be paid by cheques payable at par at such places as the Company may deem fit. In case the cheque payable at par facility is not available, the Company reserves the right to adopt any other suitable mode of payment.
The Company's liability to Bondholder(s) towards his/their rights including for payment or otherwise shall stand extinguished from the date of redemption in all events and on the Company despatching the Redemption amounts to the Bondholder(s). Further, the Company will not be liable to pay any interest, income or compensation of any kind from the date of redemption of the Bond(s).

(6) Notices
All notices to the Bondholder(s) required to be given by the Company or the Trustees shall be published in one English and one regional language daily newspaper in Mumbai, Chennai, Delhi and

(7) Interest
Payment of interest will be subject to de
provisions of the Income-tax Act.
In case of individual Bondho
Rs. 2,500/- during the financi
Bondholder should furnish eith
prescribed form i.e. Form 15H w
provisions of section 197A of the Inc
the prescribed form i.e. Form 15AA, which

Option I and II (Annual Interest)
Interest will be paid on May 1 each year. The first interest payment
commencing from the Deemed Date of Allotment and the last interest payment will be made at the
of the Bond on a *pro-rata* basis.

Option III and IV
Tax Saving Bond Options III and IV are in the nature of Deep Discount Bond. These Bonds would be issued at an Issue Price of Rs. 5000/- each and would be redeemed at the Face Value of Rs. 6,660/- and Rs. 8,950/- respectively at the end of 3 years 4 months and 6 years 6 months respectively from the Deemed Date of Allotment. Hence, no periodic interest payment will be made.

Please refer to the following CBDT clarifications for the tax treatment of Deep Discount Bonds (DDBs):

1. CBDT clarification dated March 12, 1996, which states that the difference between the redemption price and subscription price would be treated as interest income assessable under the Income-tax Act in the year of maturity. It further states that on transfer of bonds before maturity, the difference between the sale price and issue price will be treated as capital loss/gains if held by the assessee as investments or as trading profit/loss if the assessee deals in purchase or sale of bonds, securities, etc.
2. CBDT clarification no. F.No.149/235/2001-TPL dated February 15, 2002 which *interalia* states: (a) Every bondholder will have to offer to tax the difference between the market valuation made in accordance with the guidelines issued by RBI as on two successive valuation dates (i.e. March 31 each financial year) as interest income (where the bonds are held as investment) or business income (where the bonds are held as trading asset). For this purpose, market values of different instruments declared by the RBI or by the Primary Dealers Association of India jointly with the Fixed Income Money Market and Derivatives Association of India may be referred to. In a case where the bond is acquired during the year, the difference between the market value as on the valuation date and the acquisition cost, will be taxed as income. (b) On transfer of bond before maturity, the difference between the sale price and the cost will be taxable as short-term capital gains or business income, as the case may be. For computing such gains, the cost of the bonds will be taken to be the cost of acquisition plus the income offered to tax in the earlier years as explained in clause 'a' above. (c) In case of redemption, the difference between the redemption price and the value as on the last valuation date immediately preceding the maturity date will be taxed as income. In case of an intermediate purchaser, the difference between the redemption price and cost of bond will be taxable as income. For this purposes, the cost of the bond will be taken to be the cost of acquisition plus the income offered to tax in the earlier years as explained in clause 'a' above. (d) A non-corporate investor holding DDBs upto an aggregate face value of Rs.1 lac may opt to offer income for tax in accordance with earlier CBDT clarification dated March 12, 1996 stated above.

It may be noted that vide press note dated March 20, 2002, it has been clarified that the CBDT circular dated February 15, 2002 would apply to the bonds issued after the issue of the circular dated February 15, 2002. An investor is advised to consult his tax advisor for the tax treatment applicable to the bonds held by him.

The difference between the issue price and redemption price, will be subject to tax deduction at source under section 193 of the Income-tax Act, in the year of maturity as per the then prevailing provisions of the Income-tax Act, 1961.
The attention of the investor is drawn to the fact that the Issue Price of Tax Saving Bond (Options III and IV) would be eligible for benefit under Section 88 and not the Face Value of the Bond.

(8) Payment of Interest
Payment of interest on the Tax Saving Bond (Option I and II) will be made to those Bondholder(s) whose names appear in the register of Bondholder(s) (or to first holder in case of joint-holders) as on Record Date/Book Closure date to be fixed by the Company for this purpose from time to time.
Interest payment will be made by cheques payable at par at such places as the Company may deem fit. In case the cheque payable at par facility is not available, the Company reserves the right to adopt any other suitable mode of payment.

(9) Transfer/Transmission of Bond(s)
The Bond(s) shall be transferred and/or transmitted in accordance with the applicable provision of the Companies Act, 1956. The provisions relating to transfer and transmission and other related matters in respect of shares of the Company contained in the Articles of Association and the Companies Act, 1956 shall apply *mutatis mutandis* (to the extent applicable to debentures) to the Bond(s) as well. A suitable instrument of transfer as may be prescribed by the Company may also be used for the same.
In case of sale by or to companies, bodies corporate, societies registered under the applicable laws in India, Trusts, Provident Funds, Superannuation Funds, Gratuity Funds, Scientific and/or Industrial Research Organizations, Commercial Banks, Co-operative Banks, Regional Rural Banks, or NRIs, a certified true copy of the Power of Attorney or such other authority as may be acceptable to the Company must be lodged separately at the of fice of the Company/ ICICI Infotech or such other person as may be notified by the Company for this purpose, at the time of registration of Bond(s).
Transfer of Bonds to and from NRIs/OCBs will be governed by the then prevailing guidelines of the RBI.

(10) Nomination
The sole Bondholder or first Bondholder, along with other joint Bondholders (being individual(s)) may nominate any one person who, in the event of death of the sole holder or all the joint-holders, as the case may be, shall become entitled to the Bond. A person, being a nominee, becoming entitled to the Bond by reason of the death of the Bondholder, shall be entitled to the same advantages to which he would be entitled if he were the registered holder of the Bond.
Where the nominee is a minor, the Bondholder(s) may make a nomination to appoint, in the prescribed manner, any person to become entitled to the Bond(s), in the event of his death, during the minority. A nomination shall stand

(15) Bondholder not a Shareholder
The Bondholder(s) will not be entitled to any of the rights and privileges available to the Shareholders.

All future communication in connection to these Bonds should be sent to under mentioned address, quoting Bondholder Number.
ICICI INFOTECH SERVICES LIMITED, Unit : ICICI Safety Bonds - February 2002, Maratha Mandir Annexe, Dr. A. R. Nair Road, Mumbai Central, Mumbai - 400 008. Tel. : 022-8307777 Fax : 022-7912480

Financial Messaging Solution contract

Taxes&Payments

"Subject to any deductions of tax at source, if applicable, from the contract price as per clause A of schedule A of the Contract, the CONTRACTOR shall be entitled to receive the Contract Price in the following manner :

(1)All the payments shall be released directly by the PURCHASER to the CONTRACTOR

(2)The initial advance payment and payments against the delivery certificates and final Acceptance Certificates as referred to in Para B of schedule A of the contract, shall be released on completion of each milestone as indicated in the table of payment in schedule B.

(3)All the payments will be made by the purchaser only after satisfying about the satisfactory completion of each milestone as stipulated in Systems Requirements Specifications (SRS) Document referred to in Schedule B, of the Contract by the PURCHASER .

(4) ...

"Either Purchaser or Contractor can identify the need for change on the accepted deliverables.

If the Purchaser identifies the change requirement, then Purchaser will raise Request for Change (RFC) by filling the Change Management Request form. Its format will be provided by the Contractor. It will essentially cover Change Request Description, Requested Date, Priority of the request (i.e. Very Urgent, Urgent, Normal etc.). The priority will be assigned by the Purchaser Project Manager.

On receiving this request Contractor will allocate a CMR number to the request and will notify it to the Purchaser. The contractor will then evaluate the need of this change with respect to Priority, Feasibility of the change, and Impact on time frame and cost. The contractor might ask for relevant clarifications regarding the change request. It is the responsibility of the purchaser to provide the clarification in time. The Contractor will place the results of evaluation to Purchaser.

The Purchaser can approve/disapprove the change requests after seeking the relevant clarifications on the evaluation from the contractor. In case the change is approved then the Contractor will schedule the changes based on priority. The contractor will then make the necessary changes and release them to Purchaser for acceptance. The purchaser will carry out the acceptance and provide the acceptance certificate. The Change Management Form will be recorded with the result raised change request, who has incorporated the change, date of release to Purchaser.

Textile Value-chain contract

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Terms of Payment: 100% payment will be made against delivery by cheque after inspection and acceptance of the material at our stores.

"When the material is ready for dispatch", before supplying the material, please arrange to send three copies of Performa invoice indicating D.C. No. & Date in order to keep the demand draft ready.

……..

Liquidated Damages:

A) Failure to supply the goods by the time specified on the order will make the supplier liable to an unconditional liquidated damage of ½% (half percent) per week subject to a maximum of 10% (Ten Percent) of the price of the goods in arrears at the discretion of the STC. **[Clause CL-b]**

B) The purchaser shall have the right to cancel either wholly or in part the portion of the contract which is yet to be executed by supplier in case the delivery is not in accordance with the time specified in the order.

……..

Jurisdiction: All questions, disputes of differences arising under, out of or in connection with the contract shall be subject to the exclusive jurisdiction of the court within the local limits of whose jurisdiction the place from which the purchase order is issued, is situated.

……..

Quality: All goods and works must conform to the specifications quoted on the order and are to be strictly in accordance with approved samples of designs. Goods supplied are subject to inspection by our authorized representatives and the inspector has right to reject the goods of conforming to our specifications.

……...

Inspection: All goods and works are subject to our inspection. Inspection, either at your works or delivery as agreed will be carried out. The decision of our officer nominated/authorized by the GM, Materials is final. Rejected goods will be returned to the suppliers at his cost including freight on original shipment.

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PROMULGATED BY THE TEXAS REAL ESTATE COMMISSION (TREC) 02-13-06

UNIMPROVED PROPERTY CONTRACT

NOTICE: Not For Use For Condominium Transactions

1. PARTIES: _____
(Seller) agrees to sell and convey to _____
(Buyer) and Buyer agrees to buy from Seller the Property described below.

2. PROPERTY: Lot _____, Block _____, _____ Addition, City of _____, County of _____, Texas, known as _____ (address/zip code), or as described on attached exhibit together with all rights, privileges and appurtenances pertaining thereto, including but not limited to: water rights, claims, permits, strips and gores, easements, and cooperative or association memberships (the Property).

3. SALES PRICE:
A. Cash portion of Sales Price payable by Buyer at closing..... $_____
B. Sum of all financing described below (excluding any loan funding fee or mortgage insurance premium) ..... $_____
C. Sales Price (Sum of A and B) ..... $_____

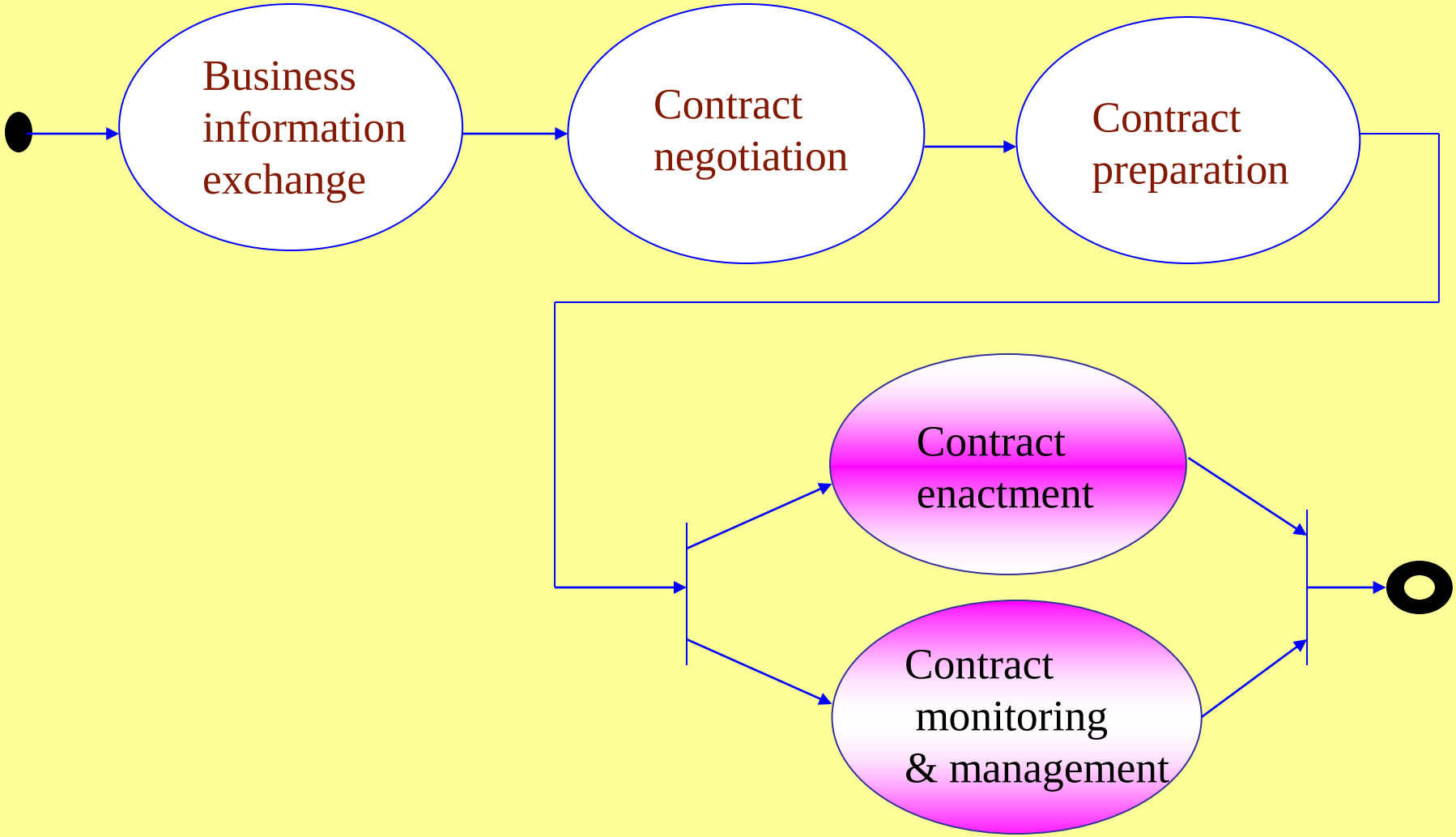
4. FINANCING: The portion of Sales Price not payable in cash will be paid as follows: (Check applicable boxes below)
❑ A. THIRD PARTY FINANCING: One or more third party mortgage loans in the total amount of $_____ (excluding any loan funding fee or mortgage insurance premium).
(1) Property Approval: If the Property does not satisfy the lenders' underwriting requirements for the loan(s), this contract will terminate and the earnest money will be refunded to Buyer.
(2) Financing Approval: (Check one box only)
❑ (a) This contract is subject to Buyer being approved for the financing described in the attached Third Party Financing Condition Addendum.
❑ (b) This contract is not subject to Buyer being approved for financing and does not involve FHA or VA financing.
❑ B. ASSUMPTION: The assumption of the unpaid principal balance of one or more promissory notes described in the attached TREC Loan Assumption Addendum.
❑ C. SELLER FINANCING: A promissory note from Buyer to Seller of $_____, secured by vendor's and deed of trust liens, and containing the terms and conditions described in the attached TREC Seller Financing Addendum. If an owner policy of title insurance is furnished, Buyer shall furnish Seller with a mortgagee policy of title insurance.

5. EARNEST MONEY: Upon execution of this contract by both parties, Buyer shall deposit $_____ as earnest money with _____, as escrow agent, at _____ (address). Buyer shall deposit additional earnest money of $_____ with escrow agent within _____ days after the effective date of this contract. If Buyer fails to deposit the earnest money as required by this contract, Buyer will be in default.

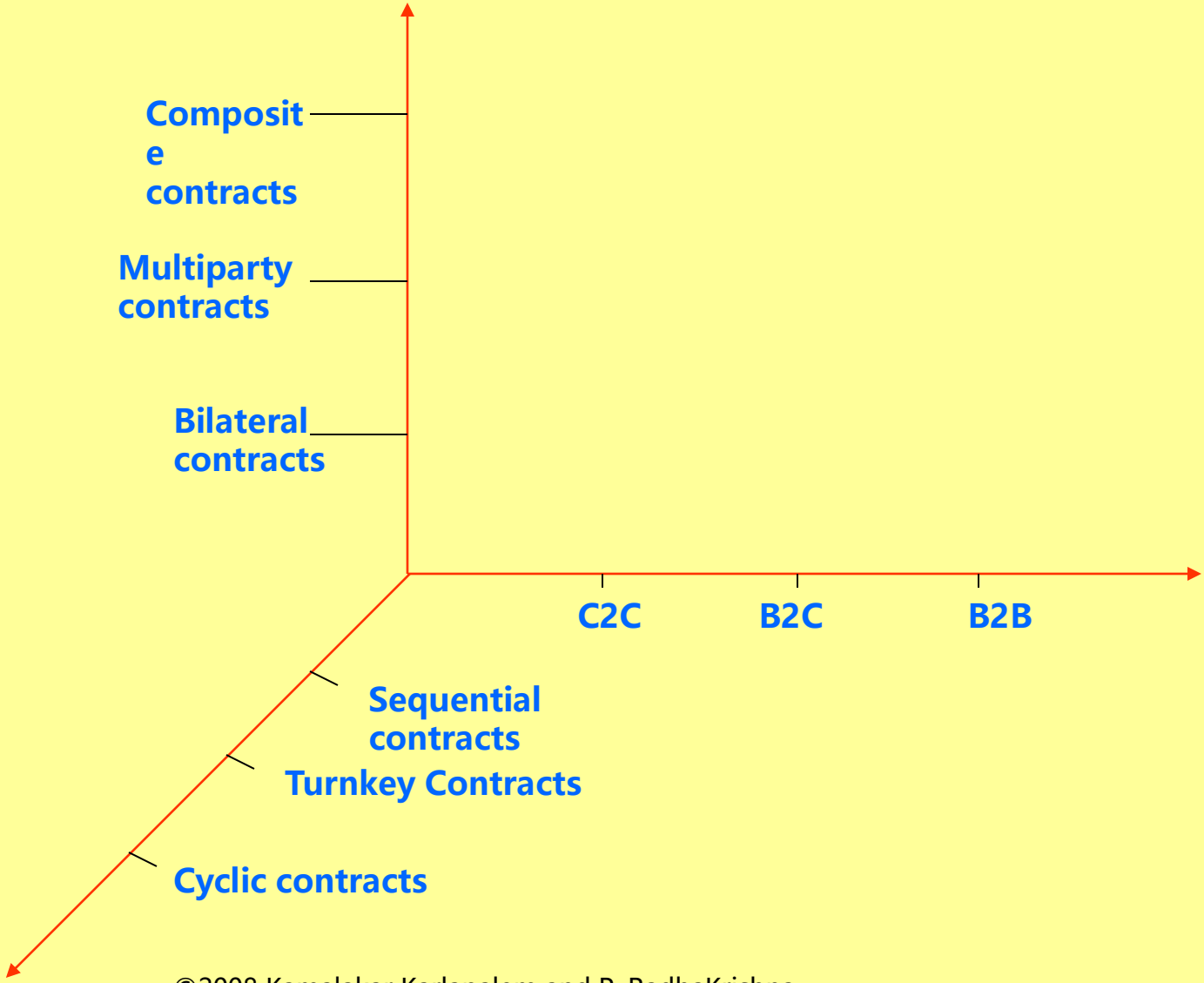
6. TITLE POLICY AND SURVEY:
A. TITLE POLICY: Seller shall furnish to Buyer at ❑Seller's ❑Buyer's expense an owner policy of title insurance (Title Policy) issued by _____ (Title Company) in the amount of the Sales Price, dated at or after closing, insuring Buyer against loss under the provisions of the Title Policy, subject to the promulgated exclusions (including existing building and zoning ordinances) and the following exceptions:
(1) Restrictive covenants common to the platted subdivision in which the Property is located.
(2) The standard printed exception for standby fees, taxes and assessments.
(3) Liens created as part of the financing described in Paragraph 4.
(4) Utility easements created by the dedication deed or plat of the subdivision in which the Property is located.
(5) Reservations or exceptions otherwise permitted by this contract or as may be approved by Buyer in writing.
(6) The standard printed exception as to marital rights.
(7) The standard printed exception as to waters, tidelands, beaches, streams, and related matters.
(8) The standard printed exception as to discrepancies, conflicts, shortages in area or boundary lines, encroachments or protrusions, or overlapping improvements. Buyer, at Buyer's expense, may have the exception amended to read, "shortages in area".
B. COMMITMENT: Within 20 days after the Title Company receives a copy of this contract, Seller shall furnish to Buyer a commitment for title insurance (Commitment) and, at Buyer's


- AMAZON RETURNS POLICY

Contract lifecycle



Contract Dimensions



Contract Dimensions

- **Based on the Applications**
  - **C2C; B2C; B2B**
- **Based on the Structure**
  - **Sequential contracts (executes sequentially in a step-by-step manner and ends after certain period of time)**
  - **Turnkey contracts (has a specific goal that needs to be accomplished within certain time and with a certain budget, and is a special case of sequential contract)**
  - **Cyclic contracts (exists even after the completion of one cycle of the contract, irrespective of the number of times the contract is fulfilled)**
- **Based on the Complexity**
  - **Bilateral contracts (Ex., buyer-seller contract)**
  - **Multiparty contracts (Ex. House Building contract)**
  - **Composite contracts (consists of several contracts, for ex., Textile value chain contract)**

Contracts

Have

- Parties – Organizations/people involved in a business process
- Activities – representing tasks/e-services to be executed during process enactment
- Clauses – describing restrictions on the execution of activities.

Contracts have some structure.

Also contracts have Negotiation, Commitment, Transactions, Exclusions, Authorization, Arbitration and Jurisdiction.

Contracts - clauses

They are mainly categorized as

a) *Obligations:* These state what the parties involved should do, thus resulting in deliverables and criteria for Quality of Service.

b) *Payments:* These state how the payments are to be made when the obligations are met.

c) *Penalties:* These state what needs to be done when the obligations are not met.

d) *Permissions:* These state what the parties are allowed to do.

e) *Prohibitions:* These state what the parties should not do.

E-Contracts: Background

- Voluminous documents
- Ambiguity and fuzziness of natural languages
- Managing/monitoring is human intensive
- Autonomous nature of individual organizations/parties
- Cross-checking for payments
- Bookkeeping for legal aspects
- Standard formats
- Computer supported contracts
- Transactions and Commitment
- Security

Handling all these aspects is a challenge

E-contracts

An E-contract is a contract modeled, specified, executed, controlled, and monitored by a software system.

All (or a number of) activities carried out by software system.

Simplified Versions..

- An e-contract is an electronic version of a conventional contract, which stipulates that the signing entities (two or more) agree to observe clauses stipulated in the document.
- An e-contract is a contract in electronic format, regulating cross-organizational business processes over the Internet.

E-Contracts: Background

- Voluminous documents
- Ambiguity and fuzziness of natural languages
- Managing/monitoring is human intensive
- Autonomous nature of individual organizations/parties
- Cross-checking for payments
- Bookkeeping for legal aspects
- Standard formats
- Computer supported contracts
- Transactions and Commitment
- Security

An E-contract is a contract modeled, specified, executed, controlled, and monitored by a software system.

All (or a number of) activities carried out by software system.

Handling all these aspects is a challenge

Electronic Contracts

- An Electronic Contract...
  - is a well-structured document
    - From the perspective of formatting
    - Semantically
  - is edited/viewed in different contexts
    - Composition, Printing, Visualisation, Signing
  - consists of standard elements plus individual extensions
  - needs to be exchanged
  - may be manipulated in a collaborative session
  - is signed by attaching signatures in a standardized way

Source:Griffel et al, 1998

PROMULGATED BY THE TEXAS REAL ESTATE COMMISSION (TREC) 02-13-06

UNIMPROVED PROPERTY CONTRACT

NOTICE: Not For Use For Condominium Transactions

1. PARTIES: _____
(Seller) agrees to sell and convey to _____
(Buyer) and Buyer agrees to buy from Seller the Property described below.

2. PROPERTY: Lot _____, Block _____, _____ Addition, City of _____, County of _____, Texas, known as _____ (address/zip code), or as described on attached exhibit together with all rights, privileges and appurtenances pertaining thereto, including but not limited to: water rights, claims, permits, strips and gores, easements, and cooperative or association memberships (the Property).

3. SALES PRICE:
A. Cash portion of Sales Price payable by Buyer at closing..... $_____
B. Sum of all financing described below (excluding any loan funding fee or mortgage insurance premium) ..... $_____
C. Sales Price (Sum of A and B) ..... $_____

4. FINANCING: The portion of Sales Price not payable in cash will be paid as follows: (Check applicable boxes below)
❑ A. THIRD PARTY FINANCING: One or more third party mortgage loans in the total amount of $_____ (excluding any loan funding fee or mortgage insurance premium).
(1) Property Approval: If the Property does not satisfy the lenders' underwriting requirements for the loan(s), this contract will terminate and the earnest money will be refunded to Buyer.
(2) Financing Approval: (Check one box only)
❑ (a) This contract is subject to Buyer being approved for the financing described in the attached Third Party Financing Condition Addendum.
❑ (b) This contract is not subject to Buyer being approved for financing and does not involve FHA or VA financing.
❑ B. ASSUMPTION: The assumption of the unpaid principal balance of one or more promissory notes described in the attached TREC Loan Assumption Addendum.
❑ C. SELLER FINANCING: A promissory note from Buyer to Seller of $_____, secured by vendor's and deed of trust liens, and containing the terms and conditions described in the attached TREC Seller Financing Addendum. If an owner policy of title insurance is furnished, Buyer shall furnish Seller with a mortgagee policy of title insurance.

5. EARNEST MONEY: Upon execution of this contract by both parties, Buyer shall deposit $_____ as earnest money with _____, as escrow agent, at _____ (address). Buyer shall deposit additional earnest money of $_____ with escrow agent within _____ days after the effective date of this contract. If Buyer fails to deposit the earnest money as required by this contract, Buyer will be in default.

6. TITLE POLICY AND SURVEY:
A. TITLE POLICY: Seller shall furnish to Buyer at ❑Seller's ❑Buyer's expense an owner policy of title insurance (Title Policy) issued by _____ (Title Company) in the amount of the Sales Price, dated at or after closing, insuring Buyer against loss under the provisions of the Title Policy, subject to the promulgated exclusions (including existing building and zoning ordinances) and the following exceptions:
(1) Restrictive covenants common to the platted subdivision in which the Property is located.
(2) The standard printed exception for standby fees, taxes and assessments.
(3) Liens created as part of the financing described in Paragraph 4.
(4) Utility easements created by the dedication deed or plat of the subdivision in which the Property is located.
(5) Reservations or exceptions otherwise permitted by this contract or as may be approved by Buyer in writing.
(6) The standard printed exception as to marital rights.
(7) The standard printed exception as to waters, tidelands, beaches, streams, and related matters.
(8) The standard printed exception as to discrepancies, conflicts, shortages in area or boundary lines, encroachments or protrusions, or overlapping improvements. Buyer, at Buyer's expense, may have the exception amended to read, "shortages in area".
B. COMMITMENT: Within 20 days after the Title Company receives a copy of this contract, Seller shall furnish to Buyer a commitment for title insurance (Commitment) and, at Buyer's

E-Contracts

Characterized by
- parties
- activities
- clauses

Can have
- sub-contracts
- payments
- budget

needs synchronization

and has a duration

Metadata

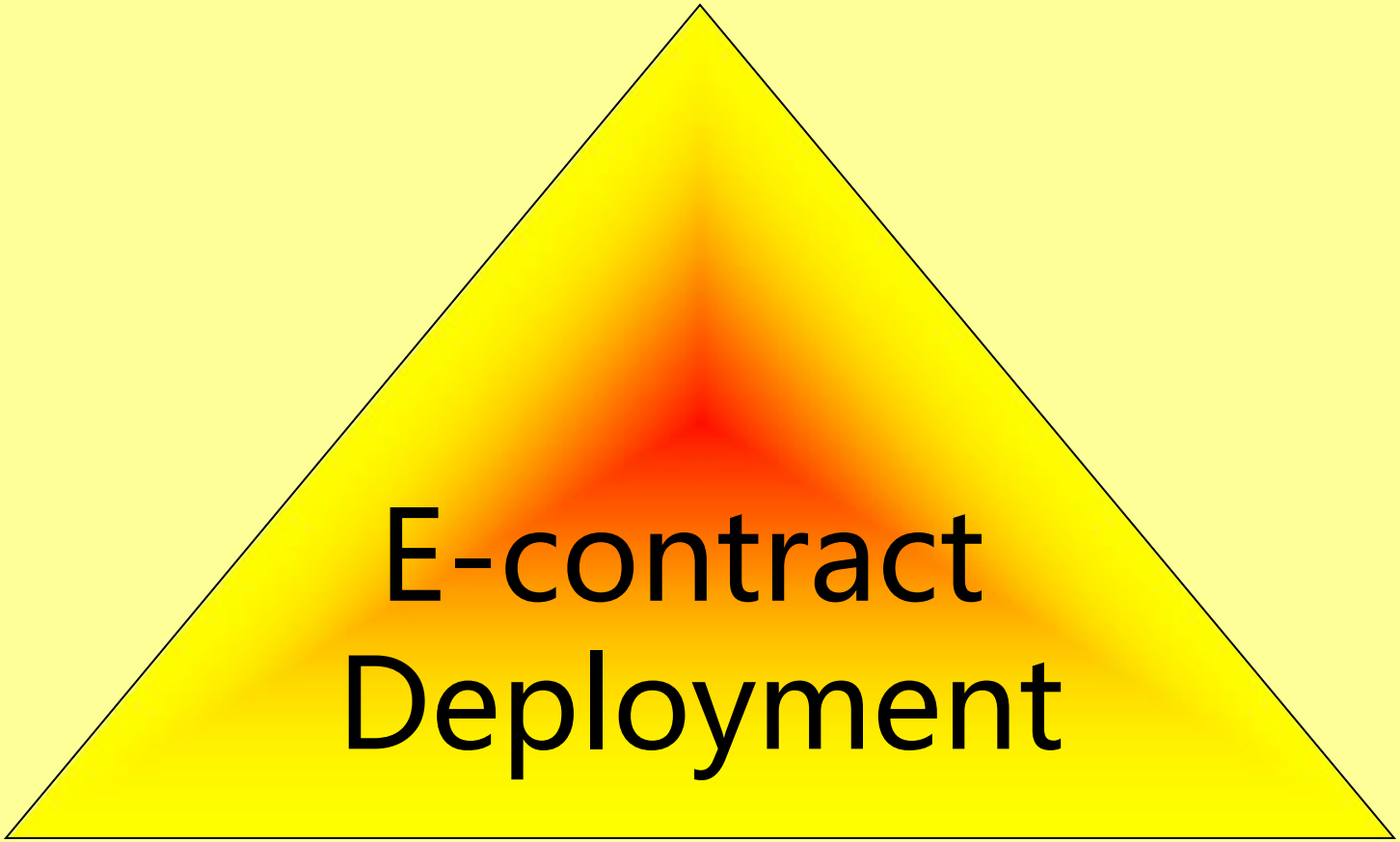
Exclusion

Authorization

Arbitration

Jurisdiction


Technologies



Collaboration Processes & Business Processes

Governance (Social, Legal, Govt. etc)

Why e-contract systems?

- Conventional software is not feasible because of loss of semantic form of contracts during the translation.
- It is human assisted task
- Multiple modules with different technologies may be required, which has to loosely adapted and integrated

Potential Advantages of e-contracts

- improved productivity
- accelerated contract lifecycle
- reduced risks and improved security
- increased profits and superior monitoring of contract enactment
- better compliance enforcement
- electronic bookkeeping (including legal aspects)
- authorization
- alerts and tracking

Source: T. Kwok and T. Nguyen, EEE'06

Supporting Technologies for e-contracts

- Active Databases and Transaction Support
- Event Distributed Architecture
- Workflows
- Web services
- SOA
- XML data Management
- Formal Languages
- NLP
- Text mining
- Process/Workflow Mining

Goal ?
Document Contracts to Executable Contracts

Steps in Modeling e-contracts

- Identify business entities (parties) and the relations between them
- List the roles to be played by various parties
- List events or actions that take place in different parts of the business processes
- Exceptions that may arise
- Realize and enact using available technologies
- Workflows
- Exclusions, Authorizations, Arbitration, Jurisdiction

Challenges

- Formal Representation languages
  - Contract representation: verbose text documents, semi-structured or structured format
- Contract Modeling
- Developing e-contract systems
  - Frameworks, Architectures
  - Integration
- Contract Enactment
- Contract Monitoring and Management

E-contract systems - Summary

- There are 20 Commercially available software products for electronic contract management (Source: International Association of Contract and Commercial Managers)
- Currently, most of these models are human and system driven prototypes (some of them in the process of developing tool-kits) to popularize e-contracts. These systems reduce the time to learn and deploy new e-contracts and manage workflows for e-contract enactment.


Source: Forrester Research, Inc., 2007

Infosys®

	Estimated number of clients, 2006*	Estimated 2006 revenues from product (US$ millions)	2006 revenue per client (US$ thousands)
Ariba	120	$26	$218
CMA Contiki	80	$4	$50
Ecteon	70	$7	$100
Emptoris	60	$32	$538
I-many	130	$20	$154
Nextance	45	$15	$333
Omniware	80	$2	$25
Open Text	30	$7	$250
Oracle	150	$48	$318
Procuri	153	$8	$50
SAP	30	$8	$269
Selectica	25	$8	$305
Symfact	40	$4	$88
Upside Software	145	$26	$181

Source: All figures are Forrester estimates, based on briefings from vendors and public data where available.
*Full-year average of month-end client counts during the year

E-contracts: State of the Art

- Electronic contract creation or representation language
- Negotiation
- Management
- Collaboration
- Execution
- Fulfillment

- Enforcement
- Performance
- Digital signature
- Data Mining

Doctoral Work...

Available through web

- Vandana Kabilan, Using Multi-Tier Contract Ontology to Model Contract Workflow Models, Stockholm University and the Royal Institute of Technology, SWEDEN, 2003
- Lai Xu, Monitoring Multi-Party Contracts for E-Business, Tilburg University, 2004
- Samuil Angelov Angelov, Foundations of B2B Electronic Contracting, Technische Universiteit Eindhoven, 2006
- Nir Oren, An Argumentation Framework Supporting Evidential Reasoning with Applications to Contract Monitoring, University of Aberdeen, 2007.

Types of e-contracting: Deep and Shallow

Samuil Angelov and Paul Grefen

Shallow e-contracting is contracting in which:

(1) Information technologies are used to support the contracting process;

(2) Contracts have digital representation;

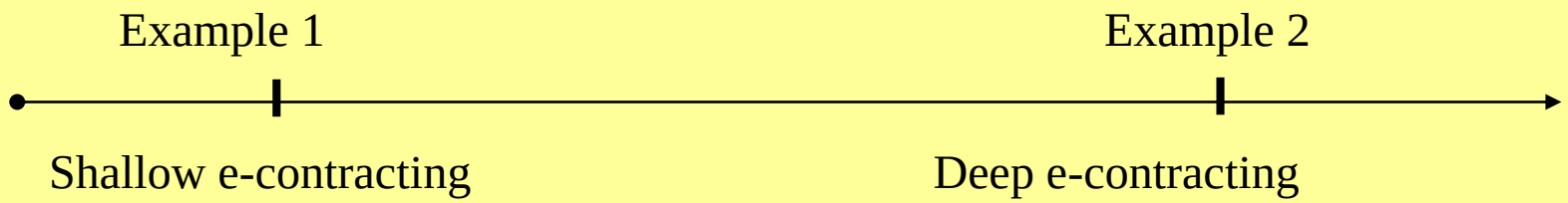
(3) The level of automation introduced by the use of information technologies does not lead to new business processes in a company (or to significant changes of the existing ones).

Deep e-contracting is contracting in which:

(1)..., (2)..., (3) The level of automation introduced by the use of information technologies leads to new business processes in a company (or to significant changes in the existing ones).

Examples

- Example1 (for shallow e-contracting) - e-mail contracting
- Example2 (for deep e-contracting) - a fully automated e-contracting system (no human intervention)

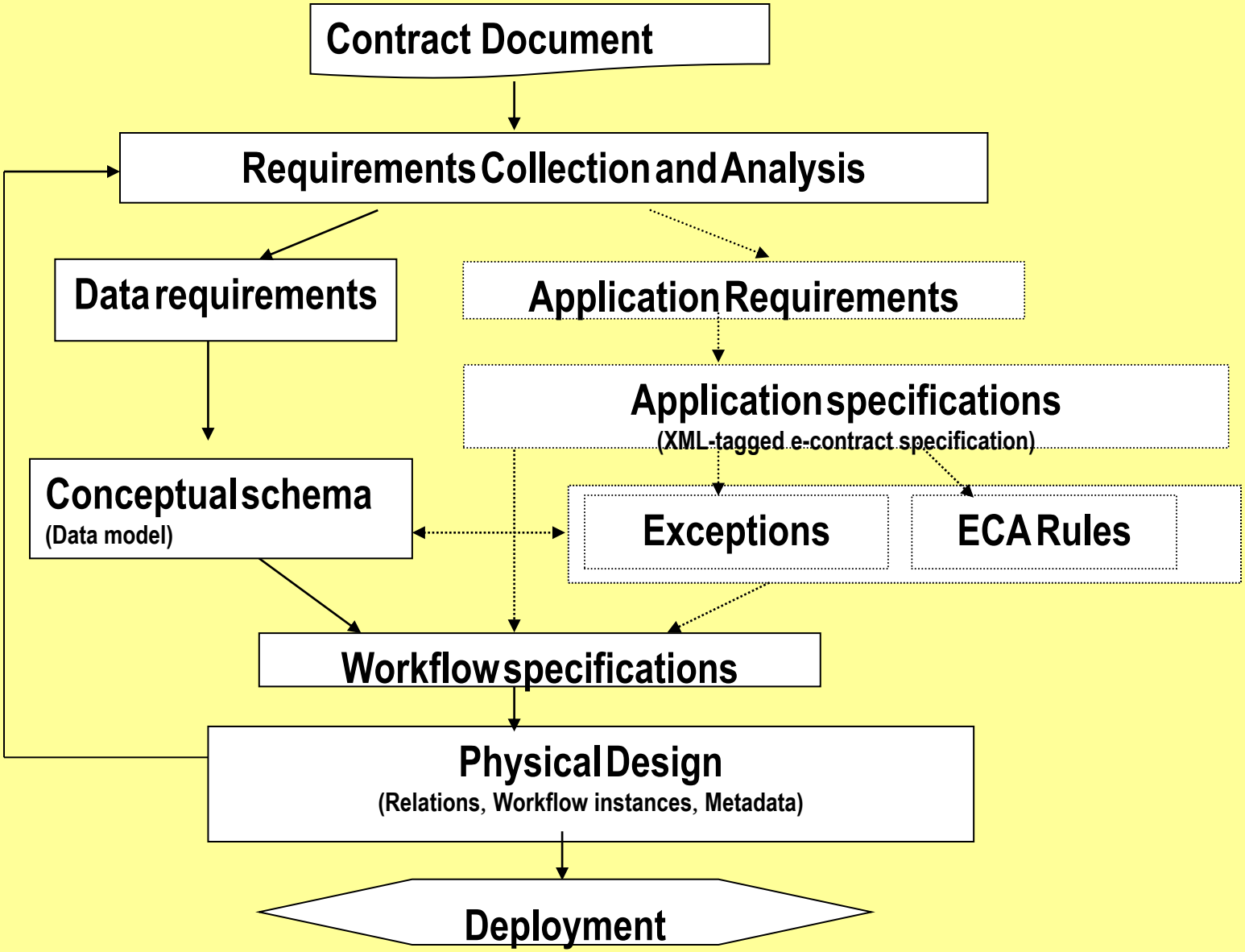


Languages to represent e-contracts

- XML
- ebXML
- ECML (E-Contract Markup Language)
- tpaML
- RuleML
- XPDL
- .....

Open Problem: Comparison and Evaluation to recommend a standard language for e-contracts

E-contract Methodology



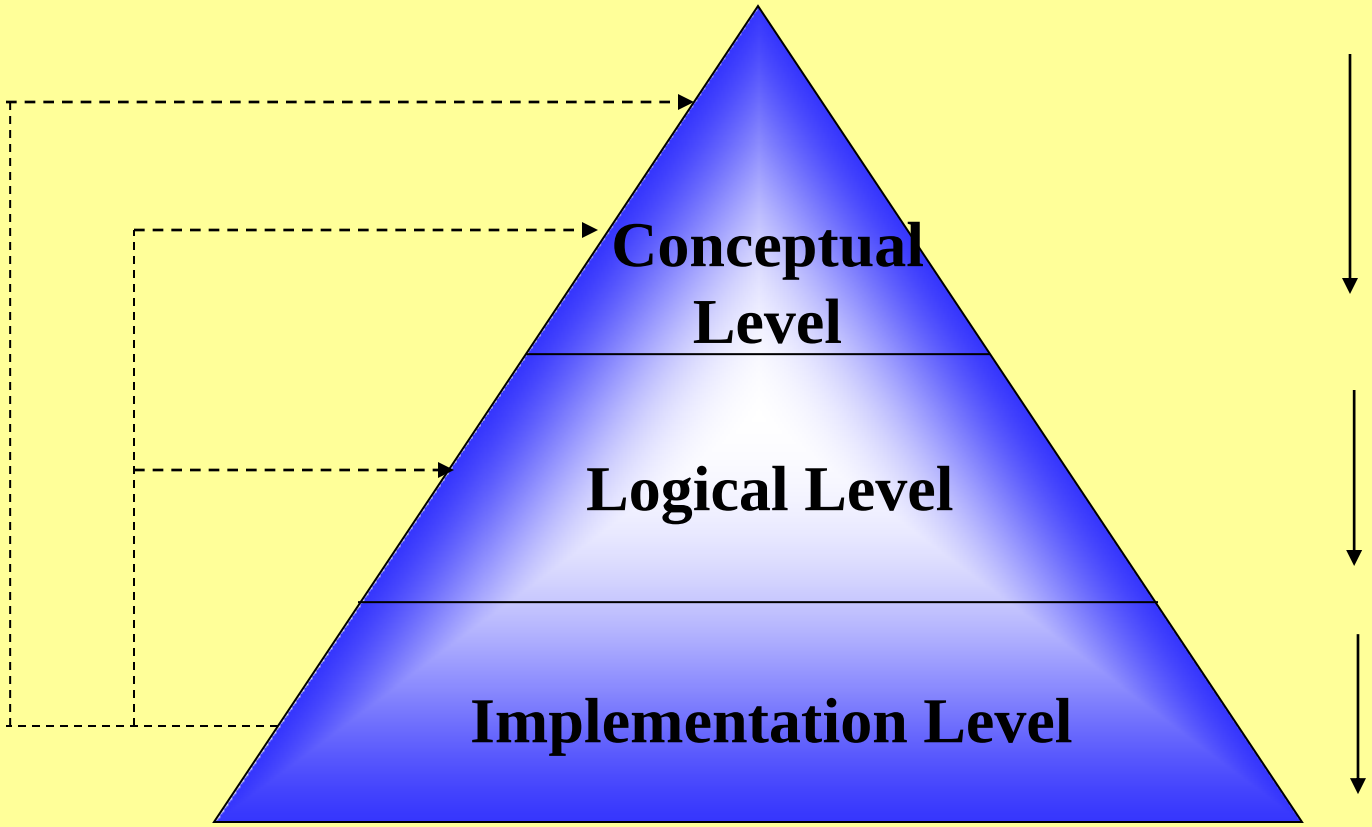

E-contract Modeling

Modeling e-contracts

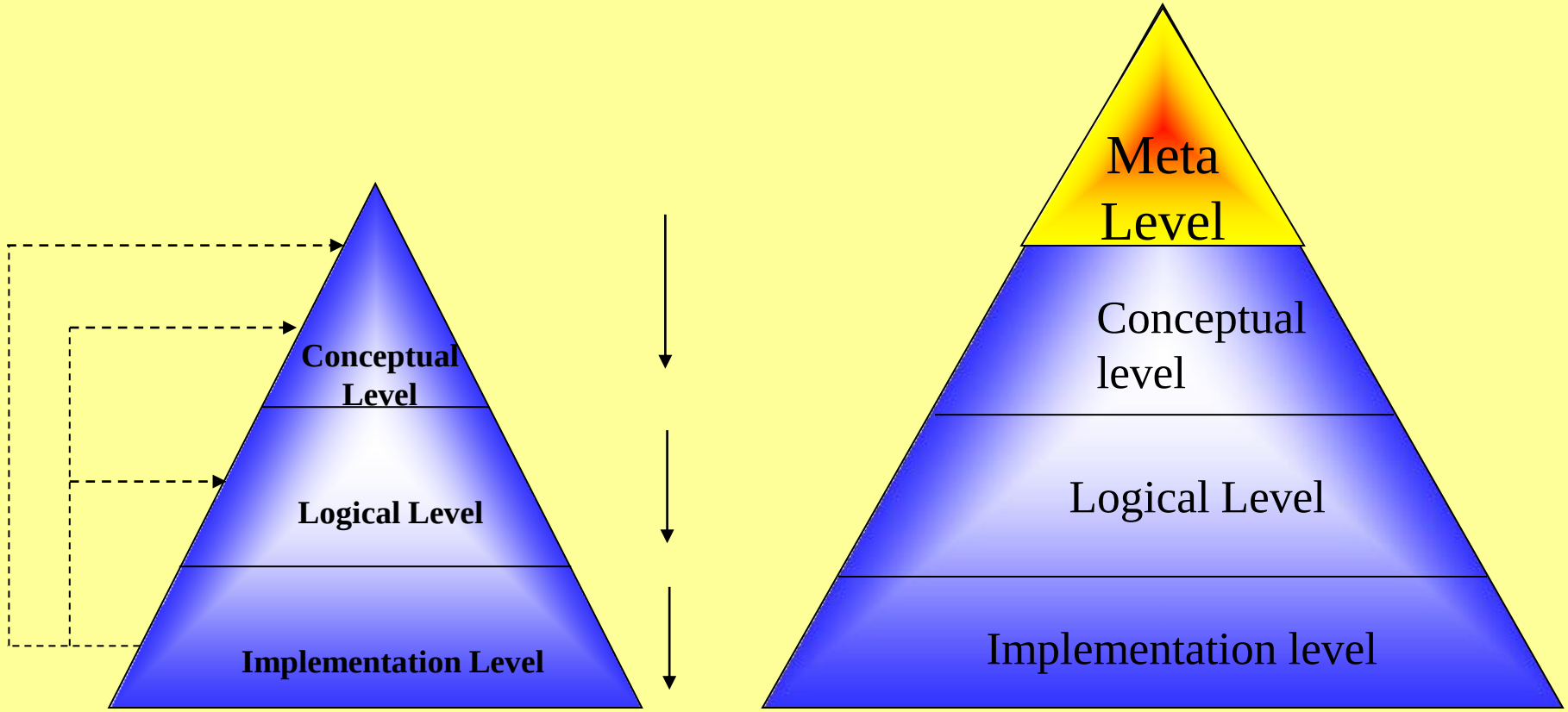
- Contract Net Protocol [Smith, 1980]
  - Old model
  - Focus on low-level transaction aspects
- ER^{EC} model [Karlapalem et al, 2001, 2004, 2006]
- Modeling contracts using UML [Chiu et al, 2003, 2004]
- CrossFlow model [Grefen et al, 2000]

…

e-Contract Modeling



e-Contract Modeling



Need for Meta-Model

- Most of the contracts have similar structure (like clauses related to payments)
- Guided approach to conceptual modeling
- Templates can be designed for specific domains
- Provides generality and flexibility
- Allows reusability and extensibility

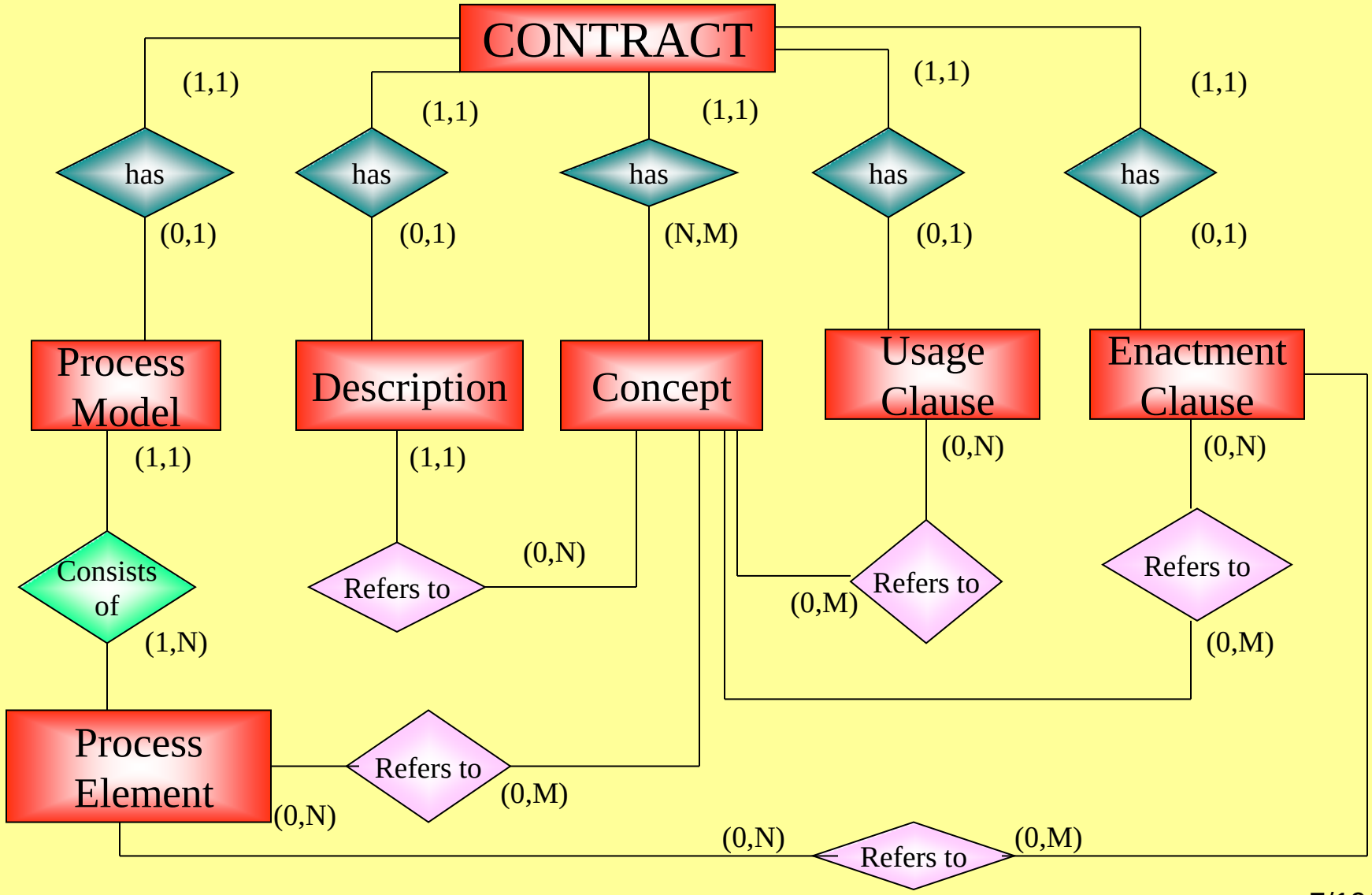
Meta-models and Templates

- Template is a instance of a meta-model for a specific application domain (with certain constraints)
- Templates guide the modeling and enactment processes
- Specific business interactions not covered by the clauses in standard contract templates can be provided as contract variations or contact escalations [Chiu et al]
- A contract clause contains a set of template variables.
- For example

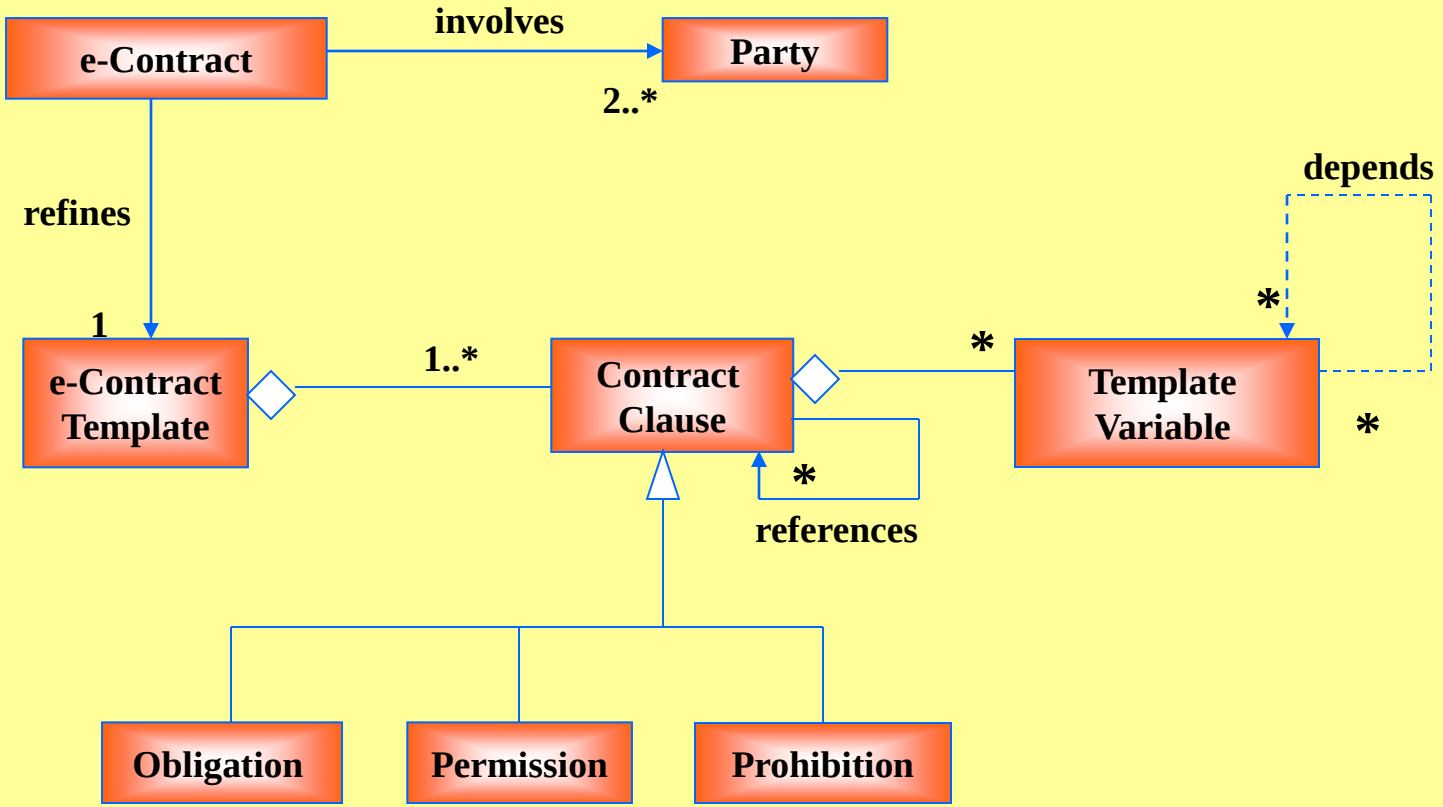
  "The Purchaser shall send a Letter of Credit (LC) for the Goods to the Supplier in the currency of { } with in { } days of the invoice date. The supplier shall on receipt of the LC ships the goods to the Purchaser with in { } days and provides the Purchaser with shipment details" .

CrossFlow e-contract meta-model

[Grefen et al]

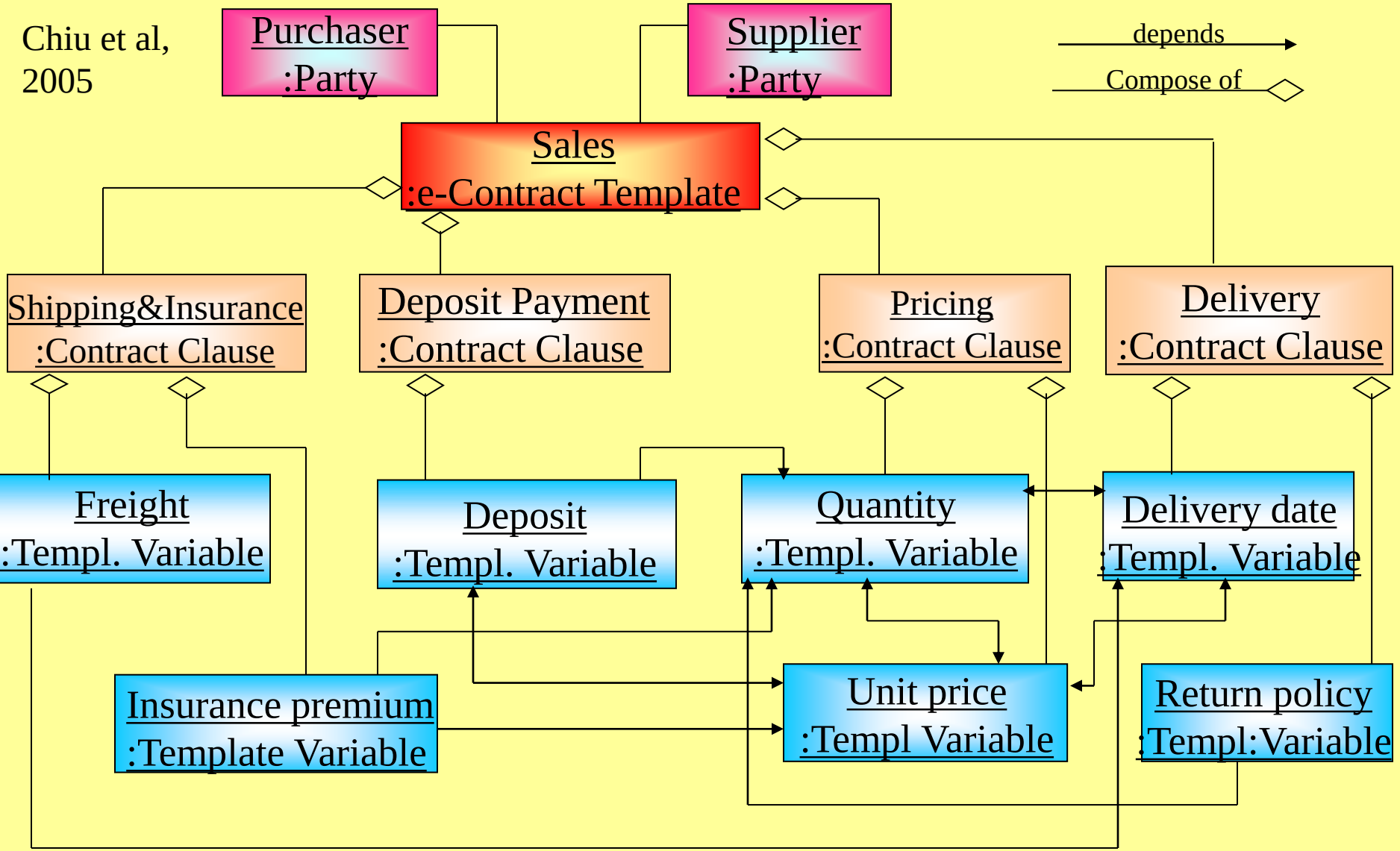


Meta –Model for e-Contract template [Chiu et al, 2005]

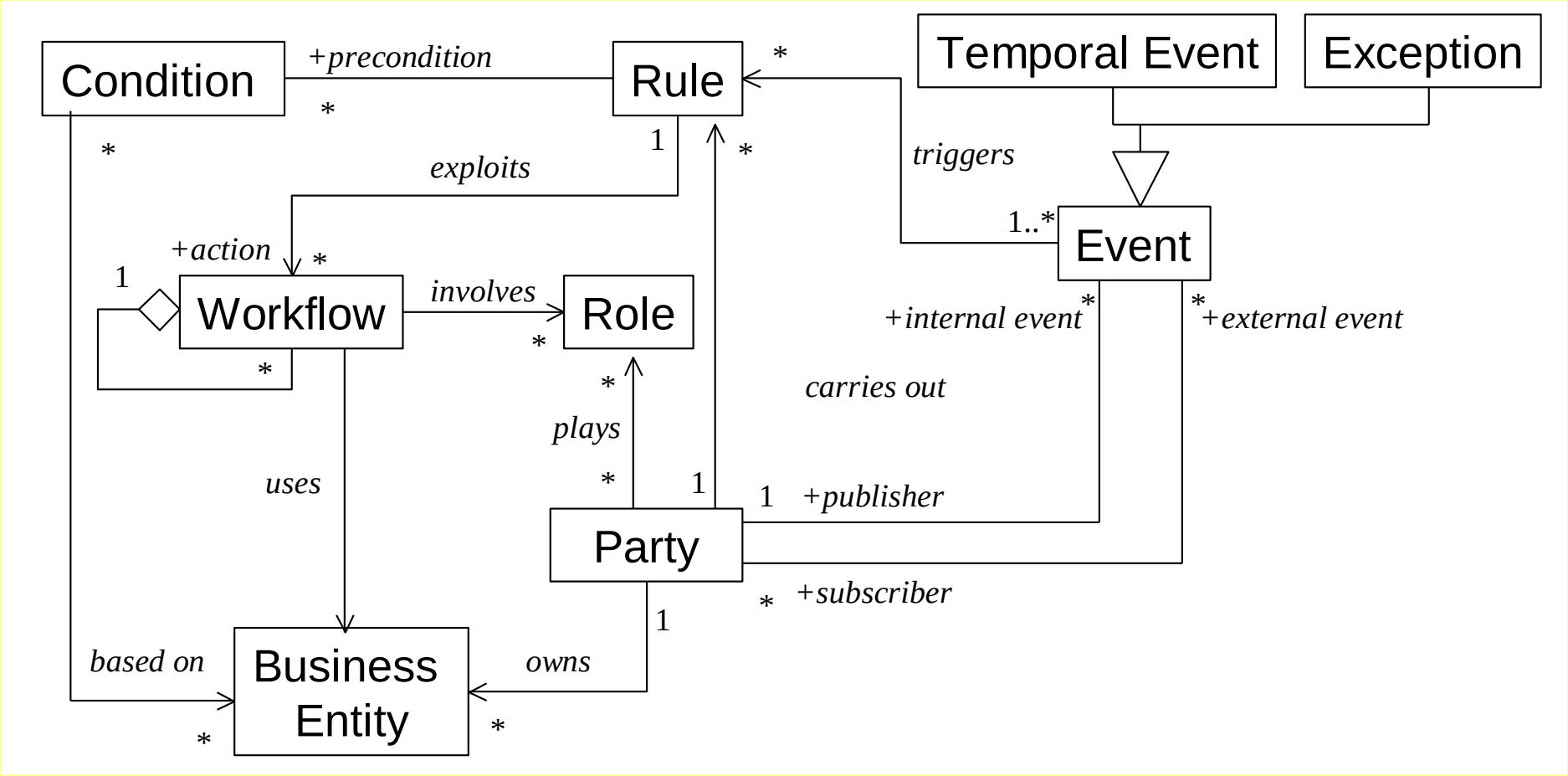


A sales e-Contract template as an instance of the meta-model

Chiu et al, 2005

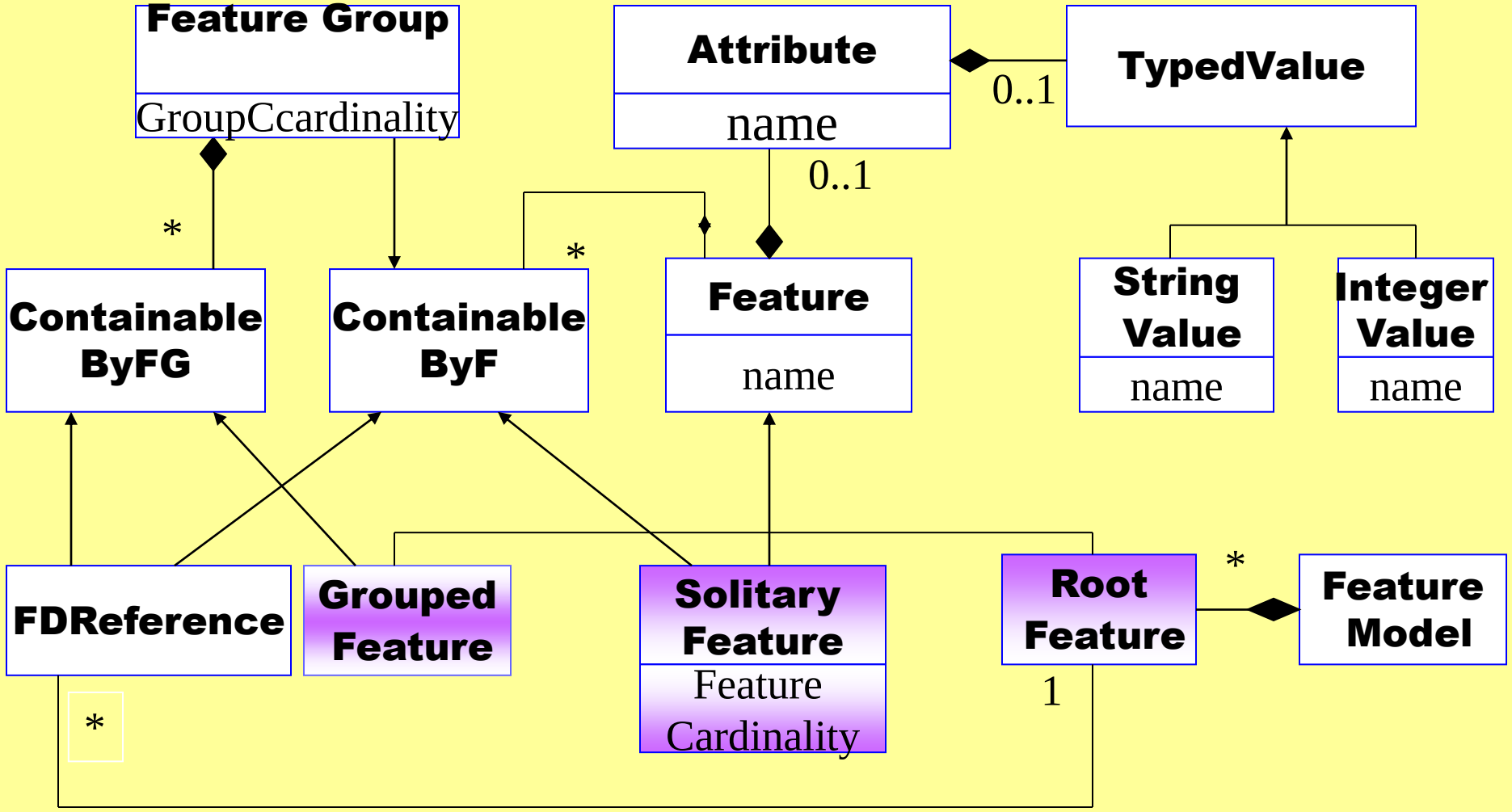


Meta-Model for ECA rule: *On* event *if* condition *then* action

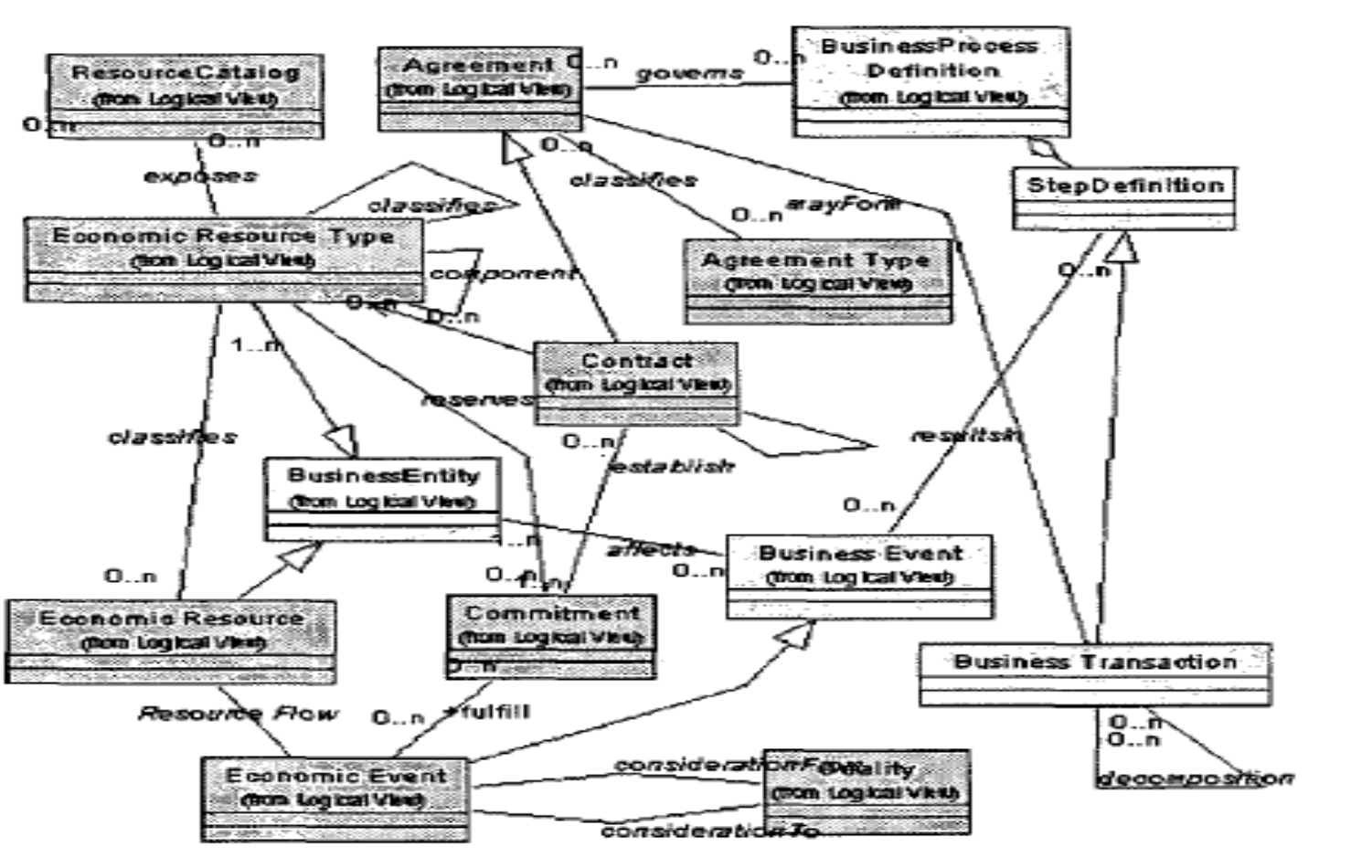


CHIU et al, 2003

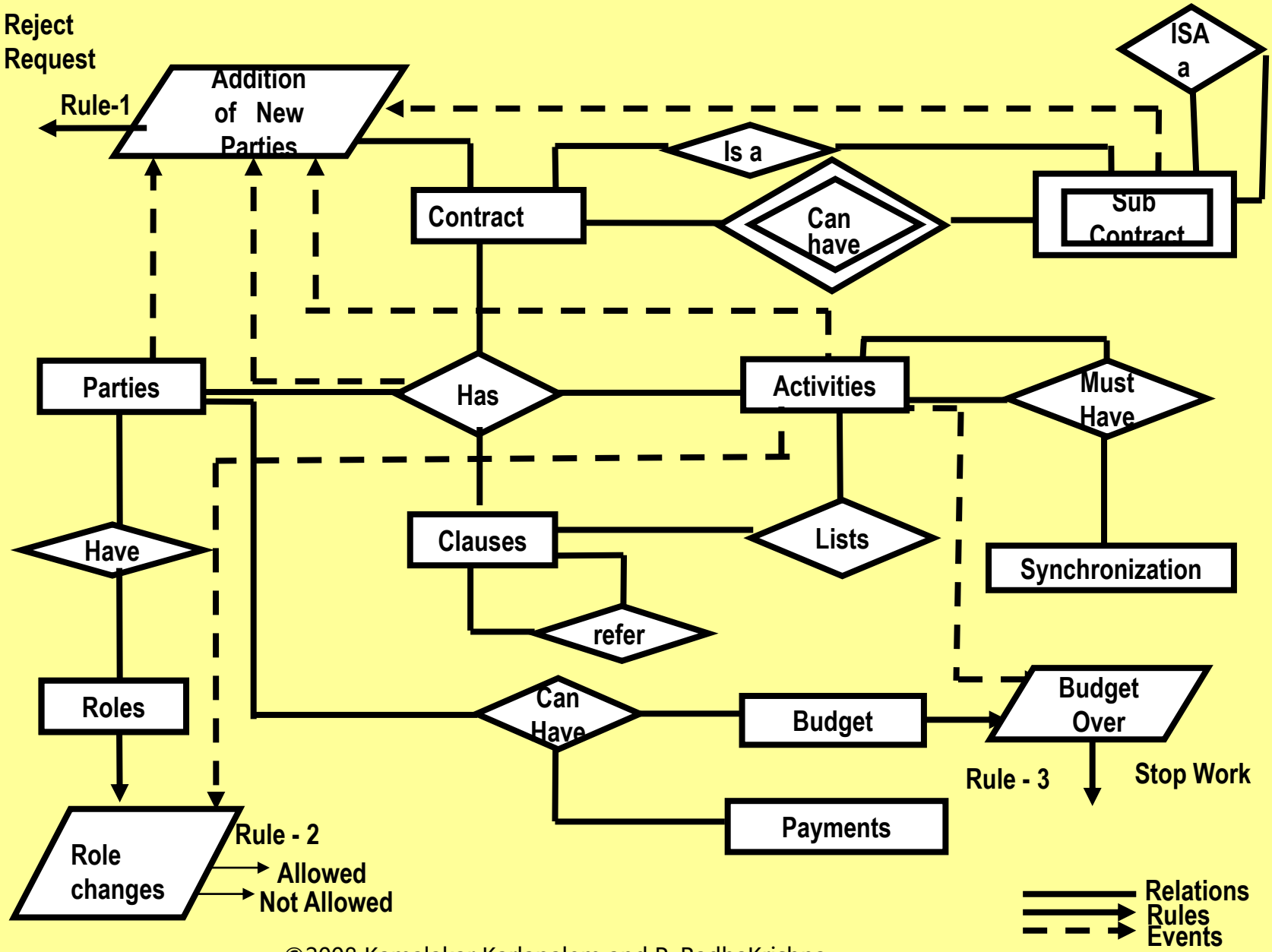
Feature Meta-model [Fantinato et al, 2006]



ebXML Meta-Model : Resources and Contracts Grouping



ER^{EC} Meta-Model




Most of these are parametric driven template based meta-models


Open Issue:

How to facilitate both domain-specific modeling along with Generic modeling?


E-contract Specification

Logics and Theories for e-contract

- Predicate Logic, first-order logic and speech act theory
- Deonitic Logic
- Model Action Logic
- Temporal Logic
- Subjective Logic
- Petri net and finite state machines
- Event Calculus

Current State of the Art in Logic & theory for e-contracts

- Horn Logic
  - Derivation rules (rule changing), Negation as failure, Procedural attachments, external data integration.
- ECA Rules
  - Active behaviour (events, actions)
- Event Calculus
  - Temporal reasoning over effects of events on fluents (contract tracking)
- Defeasible logic
  - Conflict resolution, default rules and priority relations of rules
- Deontic logic
  - Rights and obligations with violations an exceptions of norms
- Description logic
  - Contract vocabularies, domain-specific concepts

(Source: Adrian Paschke, Rule based service level agreement language, IAWTIC 2005, Austria)

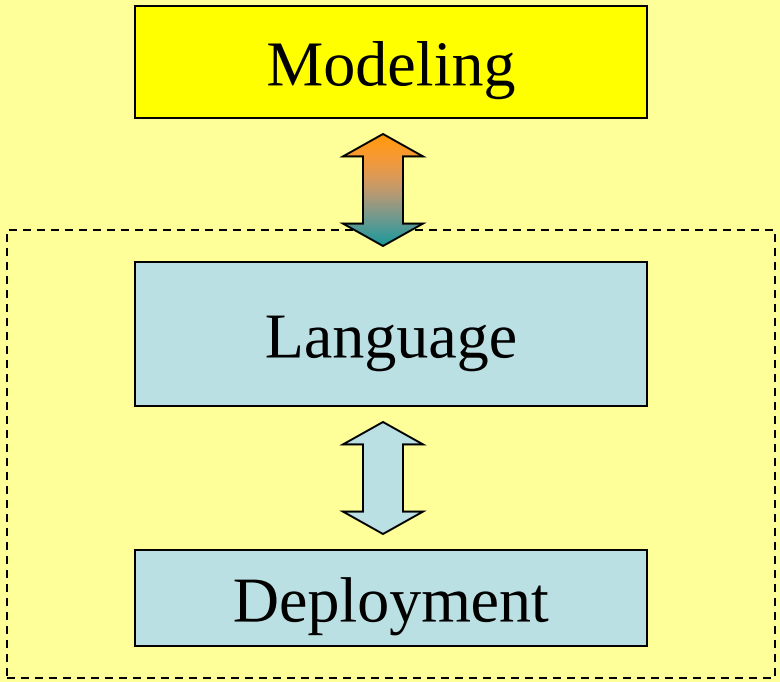
Examples of e-contract models with logic

- Declarative approach to business rules in e-commerce contracts by combining Courteous Logic Program and XML [Grosof, 1999]
- Deontic logic for contract clauses [Marjanovic and Milosevic, 2001]
- Logic formalism to represent the content of business contracts based on the Formal Language for Business Communication [Tan and Thoen, 2002]

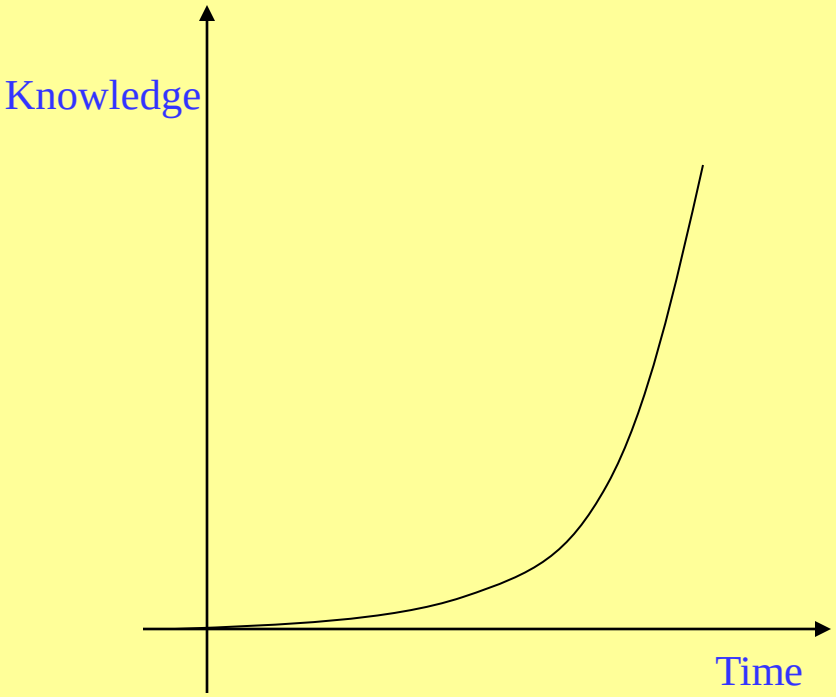
Examples of e-contract models with logic contd…

- Finite Sate Machines are used to attempt to assess contract status and implication of eventualities [Daskalopulu et al, 2001]
- CTR-S: A Logic for Specifying Contracts in Semantic Web Services. [Davulcu et al 2004]
  - extension of the classical first-order logic,
  - Suitable for both static and dynamic aspects of contracting
  - designed to model this adversarial situation through its novel model theory, which incorporates certain game-theoretic concepts.

Language Driven Solutions



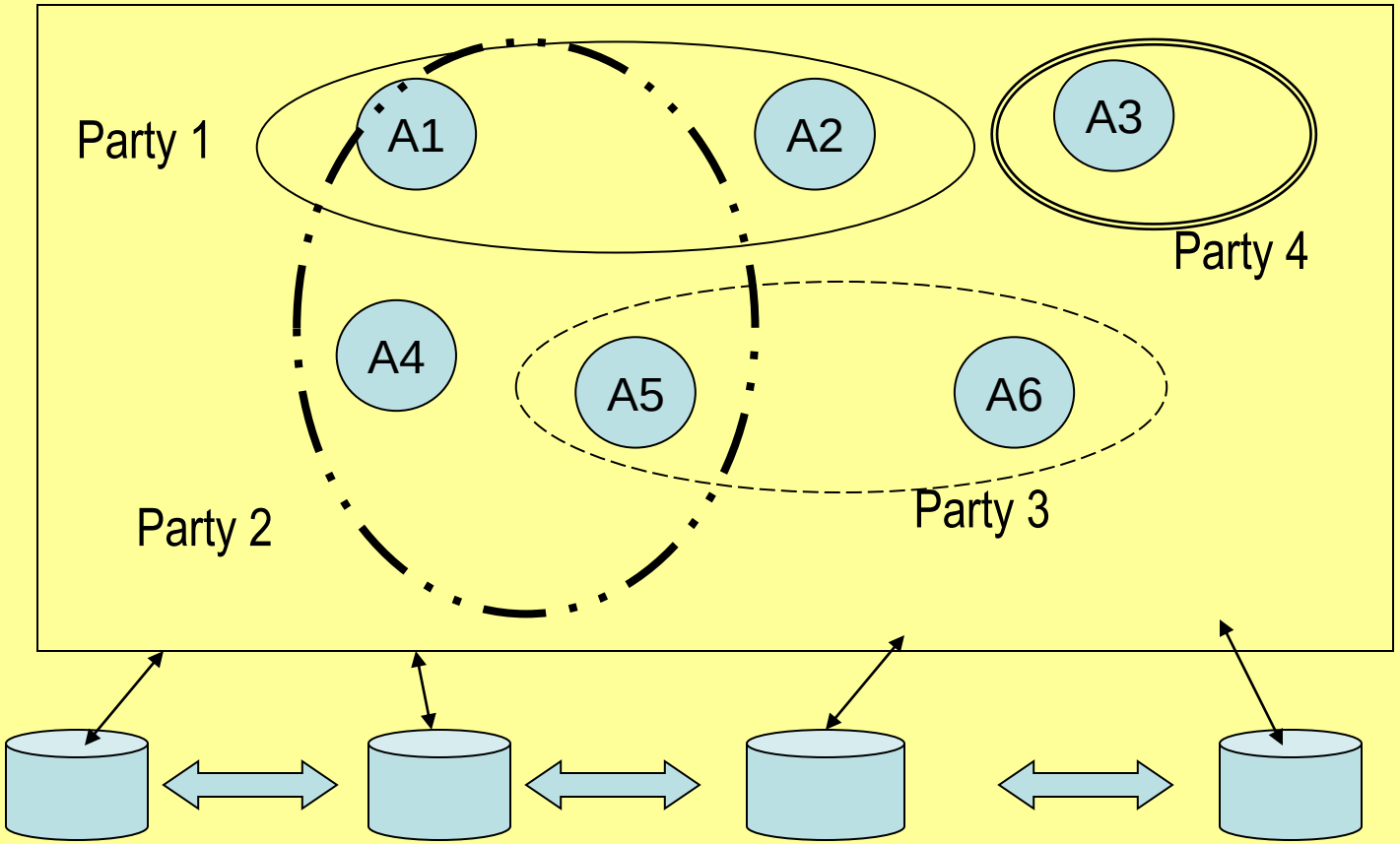
Learning Curve



- Too much language driven solutions may not provide flexible e-contract solutions
- Solutions should be language independent
- **Modeling provides language independent solutions**

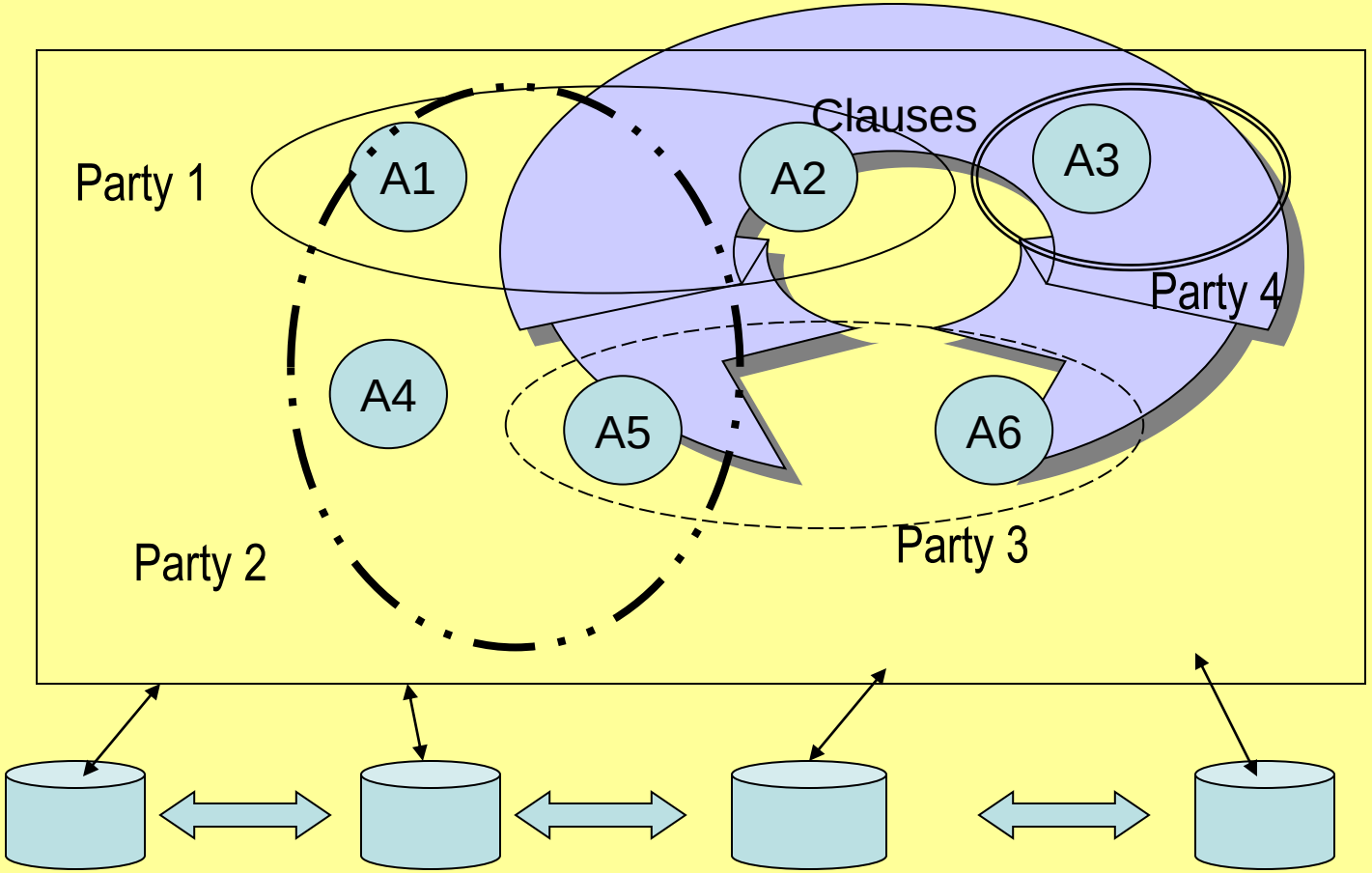

E-contract Deployment: Enactment, Monitoring and Management

E-Contracts and Web Services



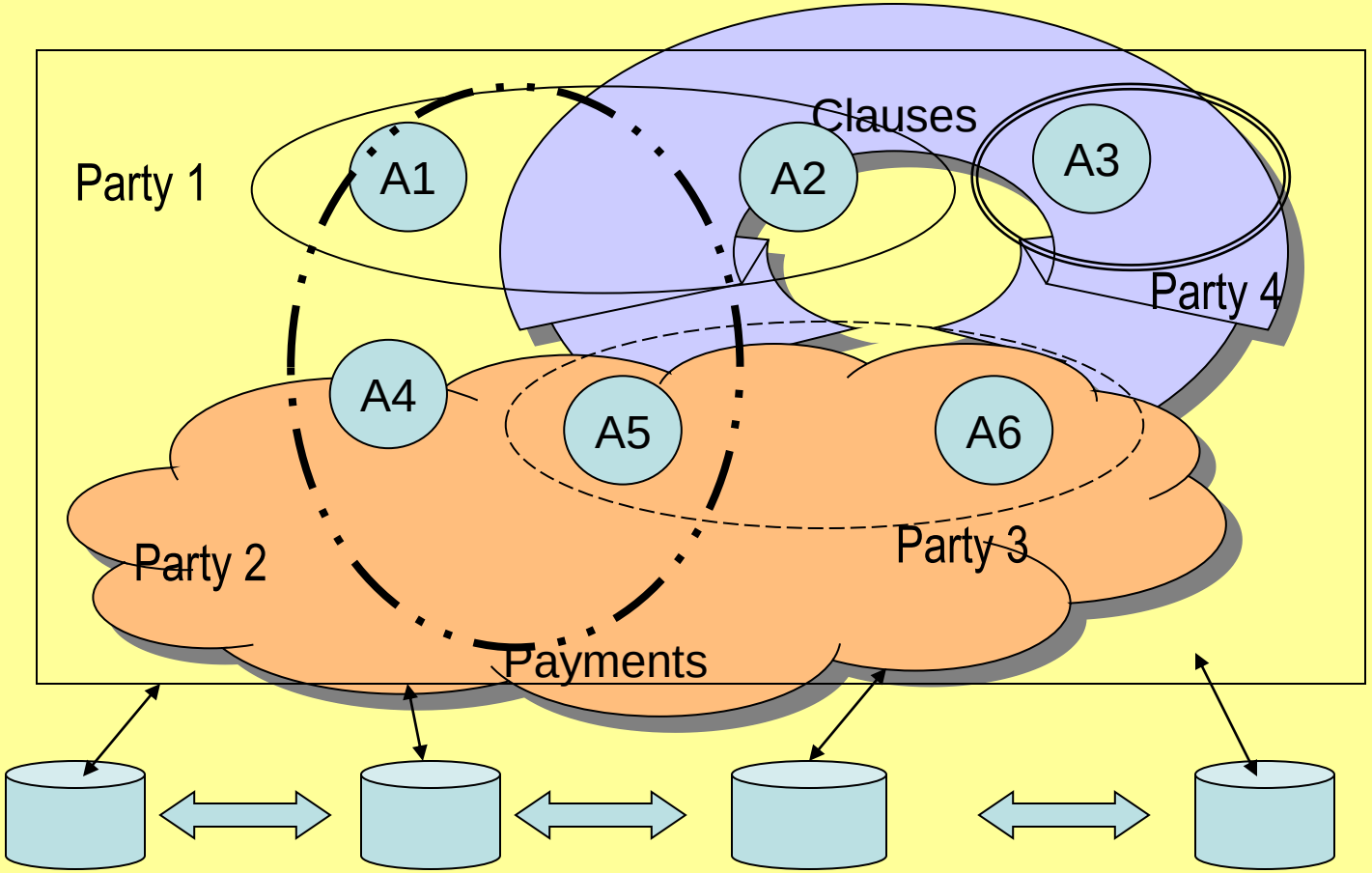
Contract activities involve inter-organizational Business processes.

E-Contracts and Web Services



Contract activities involve inter-organizational Business processes.

E-Contracts and Web Services



Contract activities involve inter-organizational Business processes.

Contemporary Web Services technologies Support

- Handling of Cross-organizational Exception and asynchronous Events
- Provide Trust and Security
- Handling long-lived business processes
- Collaboration between independent entities
- Support cross-organizational workflow execution
- Accessing Shared repository (for meta data, business semantics, etc.) in real-time and evolving services
- Match-making between contract components and service components

E-contract Framework

- Framework for legal e-contracts [Gisler et al, 2000]
- 4W Framework
- ER^{EC} Framework
- .....

B2B e-contracts: 4W Framework

(Angelov and Grefen, 2001)

- The participation of "two or more parties" leads to "Who" concept.
- An agreement that is "legally enforceable" shows that there is a context for every contract i.e., a "Where" concept.
- The "obligations in return for certain rights" relates to a "What" concept.
- The parties' commitment illustrates the existence of "How" concept.

WHO…

- **A contract has a number of *actors* associated with it. They participate in the contract establishment and enactment.**
- **Under the WHO concept, three sub-concepts are identified: a party, a mediator and an auxiliary implementer.**
  - **The companies that participate in the established contract and exchange values are called parties.**
  - **A mediator is a company or a public institution that facilitates the contract establishment and contract enactment**
  - **During contract execution, parties perform processes that are in accordance to the negotiated terms. A party may outsource a part of a process to an auxiliary implementer.**

Where …

- A contract is established and enacted in a certain *context.*
- Three context dimensions are identified under WHERE concept: legal, geographical and business.

What…

- **A contract has a *content* that describes the exchanged values, the processes that will take place for the exchanges and the accompanying provisions.**
- **Depending on the contract context, contracts are classified as complete or incomplete.**
  - **Complete contracts contain exhaustive specifications of the exchanged values and the provisions that accompany them.**
  - **Incomplete contracts allow parties unspecified behavior, which requires higher level of trust among them.**
- **In electronic contracting, where parties are unknown and business relations are short, complete contracts will play dominant role.**

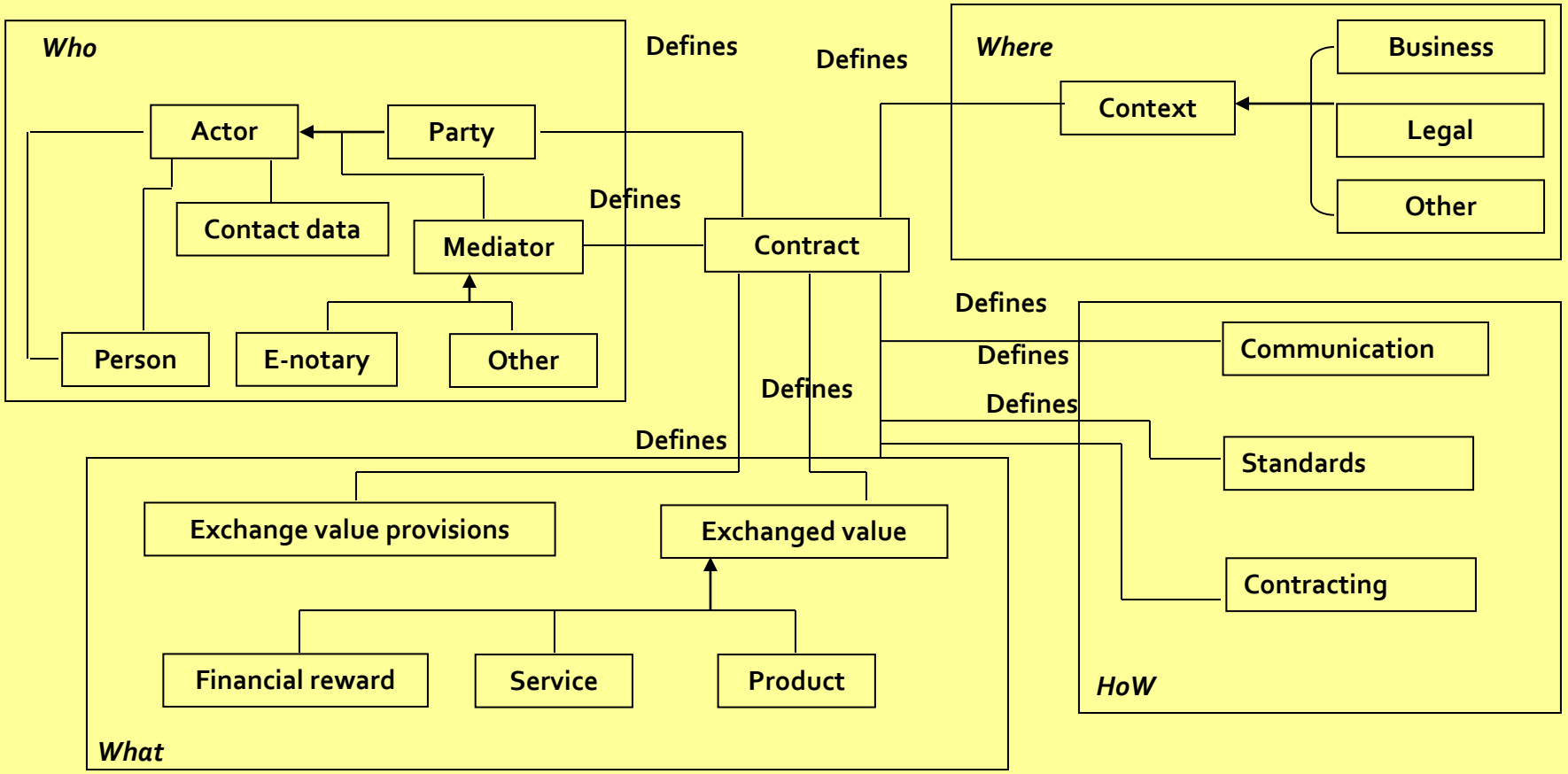
How …

- **A contract has a set of concepts related to the contracting *processes*.**
- **Under the HOW concept, three sub-concepts are identified: *contract representation and standards*, *contracting phases* and *contract structure*.**
- **Contract representation is defined by a standard. On the other hand, to achieve interoperability between the contracting parties and processes to be speeded up, standards are set.**
- **A contract passes through four phases in a standard situation: informational, pre-contractual, creation and enactment.**
- **For the faster creation of a contract offer, a party can use a partially or completely predefined contract structure.**

4Ws: Relations

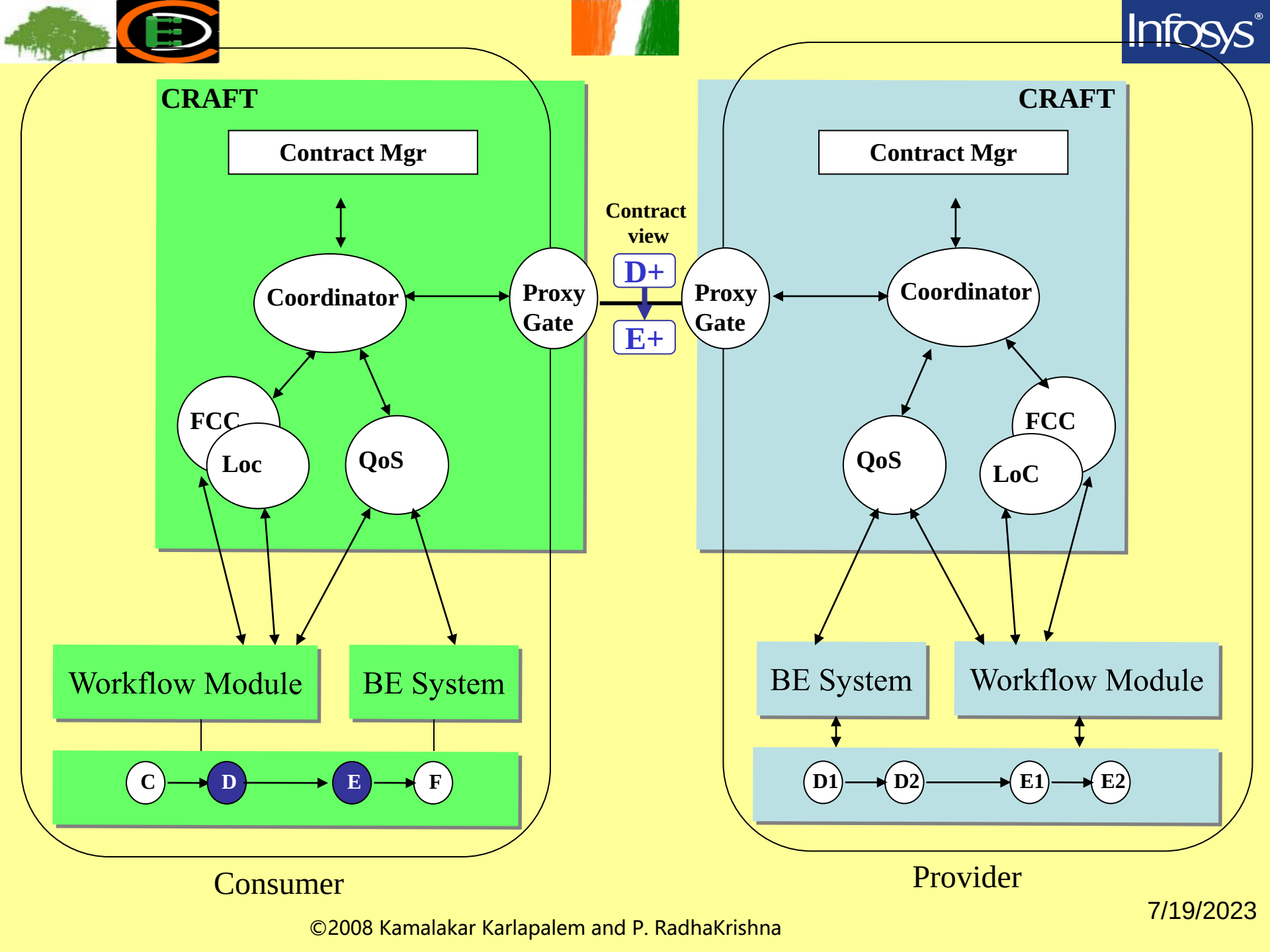
- **Relations between the 4Ws show the tight coupling among them and the complexity of the contracting process.**
- **Contracting models and software solutions for e-contracting should consider these relations.**
- **Relations of WHO to**
  - **WHERE: the participating actors define the contract context**
  - **WHAT: contracting parties are recorded in the contract content**
  - **HOW: an actor plays a certain role in the contracting processes.**
- **Relations of WHERE to**
  - **WHO, WHAT, HOW: the contract context affects the contract actors, the contract content and contract process.**
- **Relations of WHAT to**
  - **HOW: the contract content specifies the contract enactment process**
- **Relations of HOW to**
  - **WHAT: the contract content results from the contract creation process.**

4W E-contract Model



Cross-Flow Project [Grefen et al]

- Models virtual enterprises based on a service provider-consumer paradigm
- Organizations (service consumers) may delegate tasks in their workflows to other organizations (service providers)
- Virtual organizations are dynamically formed by contract-based matching between service providers and consumers



Cross-Flow Project [Grefen et al] contd..

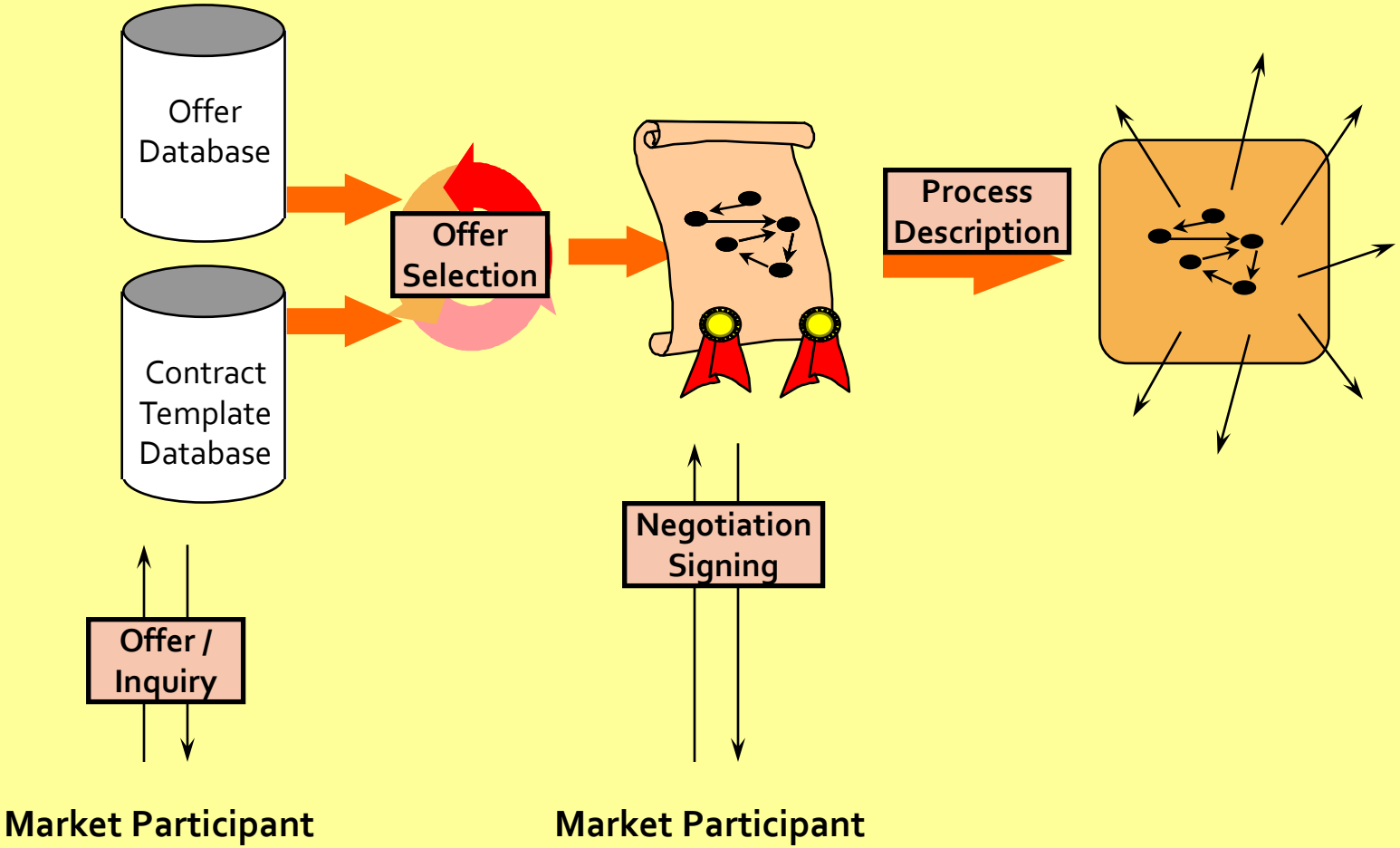
- No sophisticated mechanism such as workflow views for information and control exchange between workflows of different organizations
- Contract enforcement is not straight forward (like E-ADOME workflow views equipped ECA-Rule mechanisms based on cross-organizational events)


COSMOS Project

- Stands for Common Open Service Market for SMEs
- Internet based electronic contracting service to facilitate business transaction process
- Developed based on Contract Object Model to describe an e-contract as a combination of objects, which can be exchanged between different parties and stored in XML format
- COSMOS workflow engine invokes functions in accordance with temporal constraints extracted from contracts
- Developed a CORBA-based system to implement the contracting service

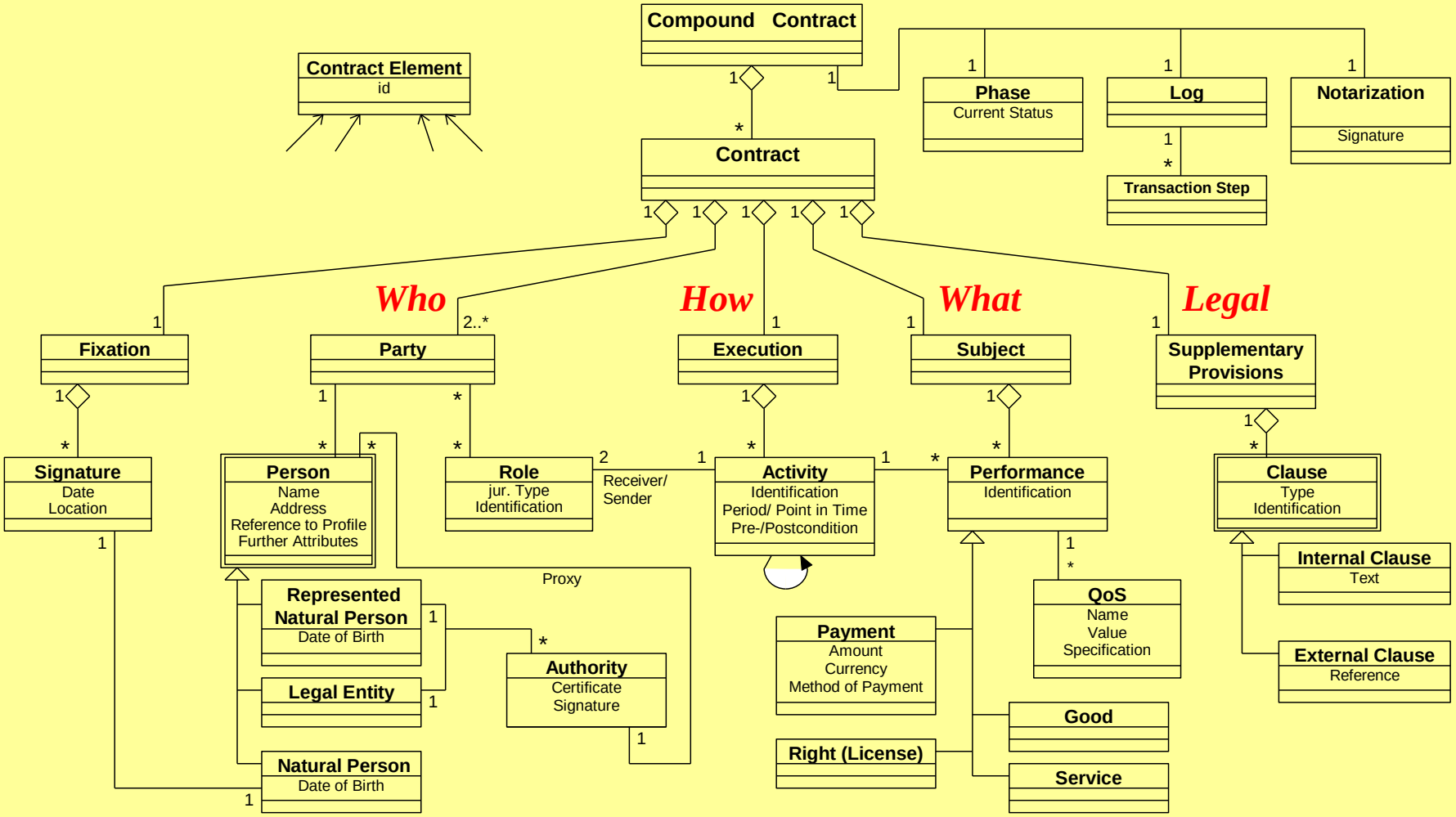
http://vsys-www.informatik.uni-hamburg.de/projects/cosmos/index.phtml

COSMOS Architecture



M. Merz & P. Hamburg
W3C Dsig Workshop

The COSMOS Contract Model



COSMOS Project contd...

- It assumes conflict-free specifications and can reason neither about conflicting obligations, not about powers of parties
- It ignores the possibility of deviation from expected behavior
- Does not provide reason about the consequences of violation

SweetDeal system (Benjamin and Poon)

- Rule-based e-contracts (SweetRules)
- Allows software agents to create, evaluate, negotiate and execute e-contracts with substantial automation and modularity.
- Represents contracts in RuleML and incorporates process knowledge descriptions based on the ontologies.
- Semantic Rich system
- Facilitates Monitoring and Exception handling

	Crossflow	COSMOS	Sweetdeal	ER^{EC}
Business Information Exchange			√	
Negotiation		√	√	
Modeling	√	√		√
Specification			√	√
Monitoring	√		√	√
Enactment	√	√	√	√
Management				

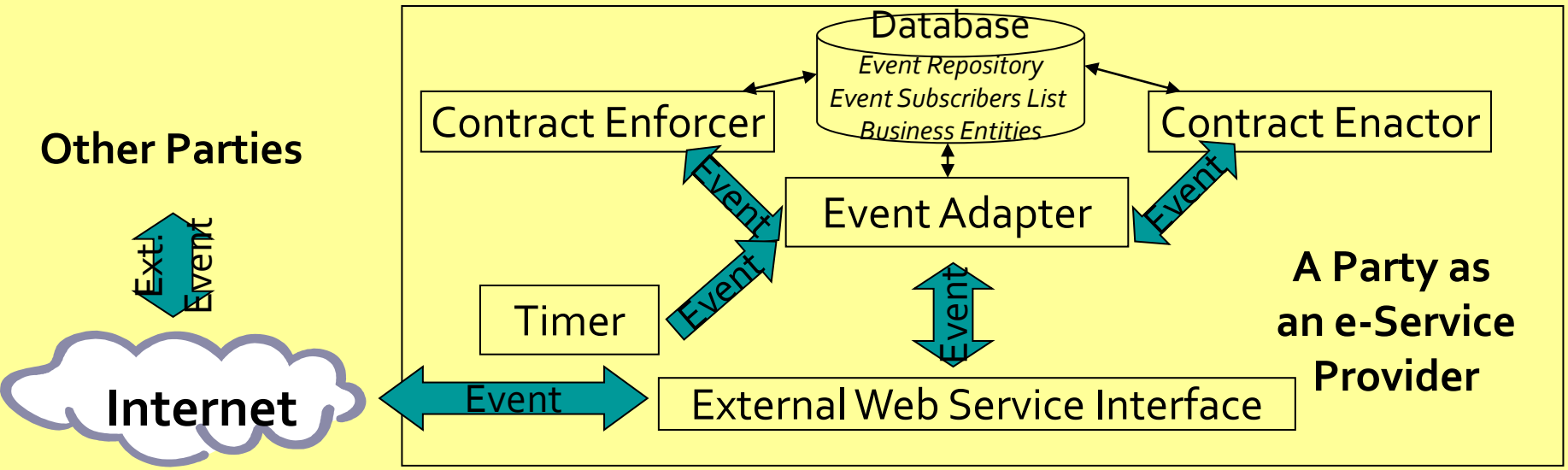
Three-Layer Framework by Chiu et. al. (2003)

- An e-contract enactment system has been based on three-layer framework.
  - Business Layer
  - Structural Layer
  - Implementation Layer
- E-contracts are modeled in UML
- Implementation architecture is based on cross-organizational workflows using Enterprise Java Bean and Web services.

Three- Layer Framework by Chiu et. al. (2003) contd..

- **Business Layer :**
  - **E-contracts are defined through analyzing the contract clauses to business rules and business entities based on ECA paradigm**
  - **Business parties, business rules, business entities**
- **Structural Layer :**
  - **Requirements for the e-contract enactment workflow are elucidated through requirement analysis**
  - **Cover both static and dynamic aspects**
  - **User case diagrams, activity diagrams**
- **Implementation Layer:**
  - **Consists of components of contract activities, workflows among these activities and web services**
  - **Cross-organizational workflows and interfaces are implemented using Enterprise Java Bean and Web services.**

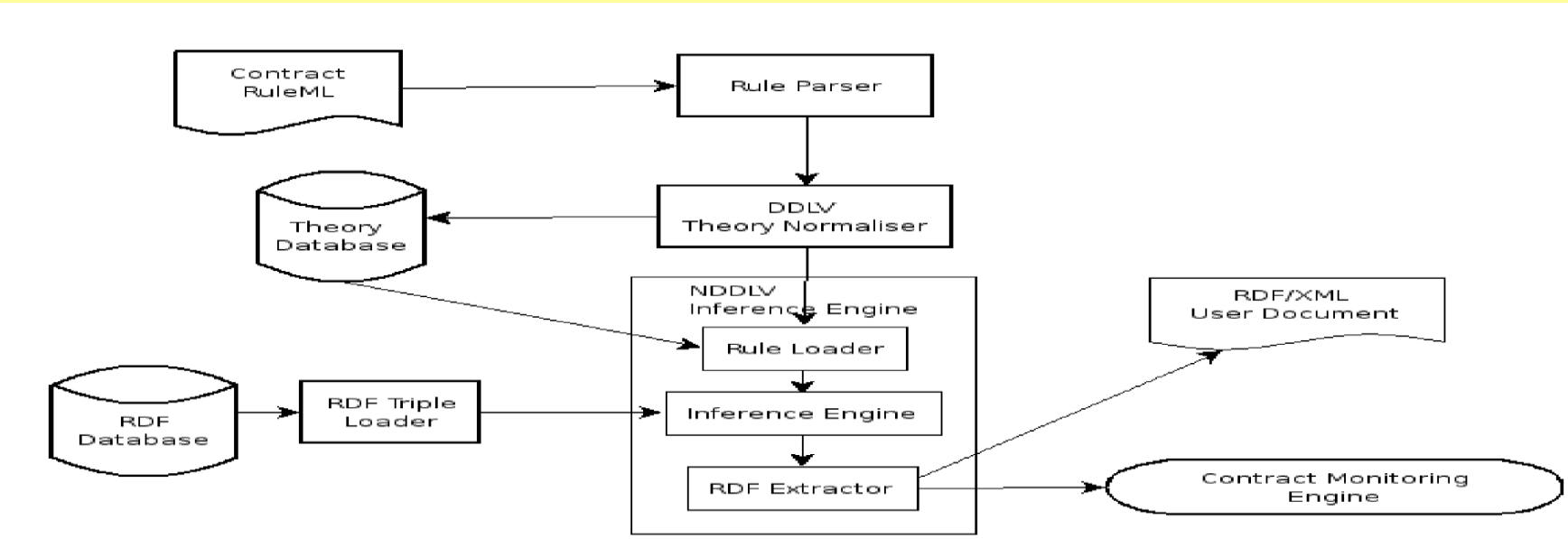
Architecture for cross organizational E Contract Enforcement



- Motivated by the *active database paradigm*
- Event - occurrence of something interesting to the system itself or to user applications
- Event driven execution of rules in event-condition-action (ECA) form
- ECA (active) rules: *On* event *if* condition *then* action
- Exceptions and alerts are events too (*action* = handler)
- Ensure efficiency and timeliness - monitor becomes only active when an interesting event occurs

DR-CONTRACT System Architecture

[Governatori and Hoang, 2005]



The architecture is inspired by the system architecture of the DR-DEVICE family of applications.

The main differences between DR CONTRACT and the DR-DEVICE is in the use of an extended variant of Defeasible Logic.

The extensions are in the use of modal operator and a non classical operator for violations.

The same difference applies for the SweetDeal approach by B. Grosof

Other e-contract projects/Systems

- SeCo Project [Runge et al]
  - Secure Electronic Contracts
  - Described a SeCo Container which has three layers – logic, information and communication layers
- Coyote Project [Dan et al, 1998]
  - Cover Yourself Transaction Environment
  - Focus on multi-party e-commerce framework
- SORM Model [Ludwig and Stozle, 2003]
  - Simple Obligation and Right Model
  - Runtime management of electronic service contracts

Other e-contract projects/Systems

- **Business Contract Architecture (BCA) [Milosevic et al, 1995]**
  - **Assumes contracts are provided a priori**
  - **Supports static e-contracts - not suitable for dynamically changing business and regulatory environments**
- **HP Labs [Morciniec, 2001]**
  - **Work-in-progress**
  - **A high-level architecture for regulating electronic marketplaces using contracts embodied in XML**
- **EDEE contract enforcement system [Bacon and Moody, 2003]**
  - **Prototype**
  - **Based on persistent occurrence histories and incremental continuous query evaluation for monitoring of e-contracts**

Monitoring e-contracts

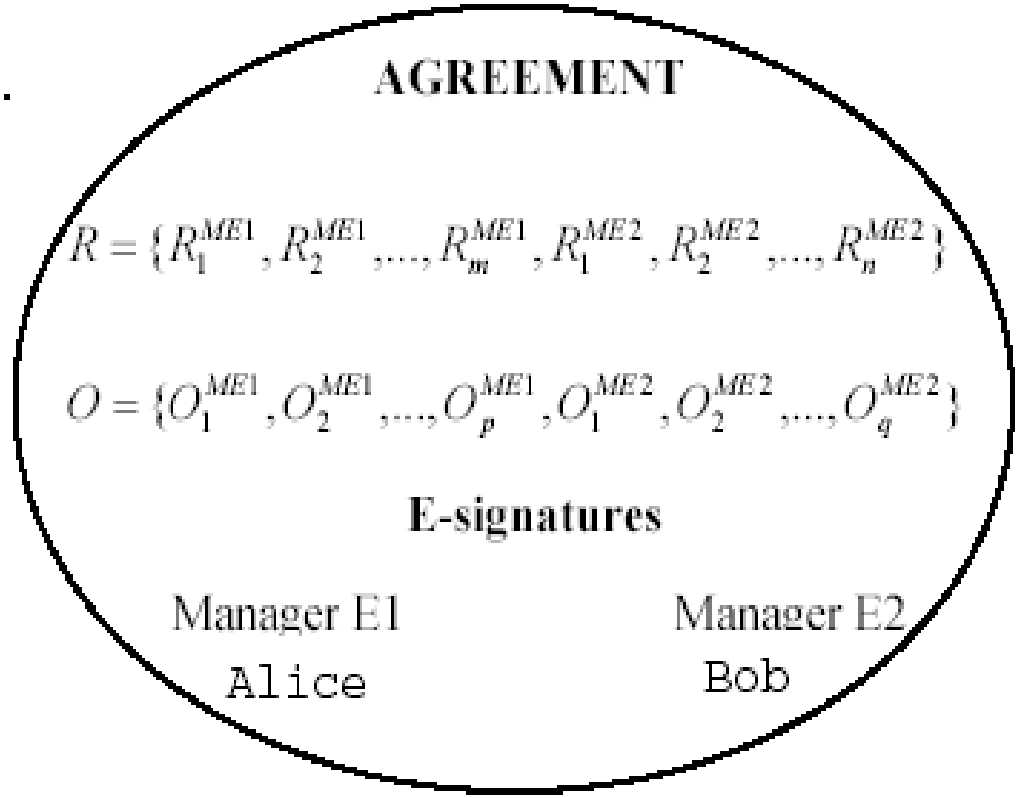
- **Event based monitoring**
  - **Event types: temporal, database, external etc.**
  - **Contract events are mutually exclusive**
  - **Specifying and detecting events play an important role in the process of analyzing, monitoring and visualizing the behavior of each party involved in the e-contract**
  - **Rouached et al presented event-based framework associated with a semantic definition of the commitments expressed in the event calculus, to model and monitor multi-party contracts**
  - **Farrell et al (2004) presented automated performance monitoring of e-contracts, in terms of tracking contract state by defining an XML formalization of the event calculus, ecXML**

Monitoring e-contracts contd…

- **Pro-Active monitoring**
  - **Xu and Jeusfeld, 2003**
  - **Handles the following questions**
    - **Given the current state of contract execution, which actions are expected from a partner in the future**
    - **Is a contract violation imminent, i.e., likely to happen within short time? Which partner have to remind to fulfill her obligation?**
    - **Which partner is responsible for a contract violation?**
  - **Proposed a framework for monitoring e-contracts during the contract execution.**
  - **Temporal logic has been used to represent the e-contract, which enables the pro-active monitoring of e-contracts.**

Monitoring and Enforcement of e-contracts using Finite State Machines [Molina-Jimenez et al, 2003]

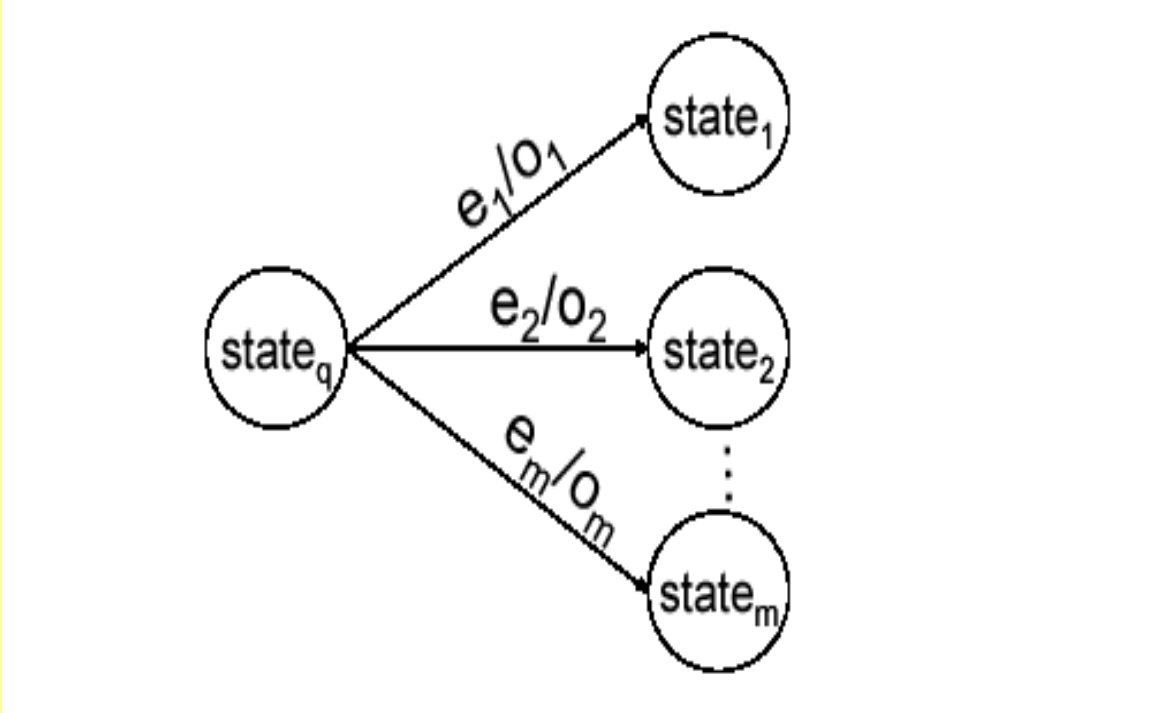
Main elements of an e_contract



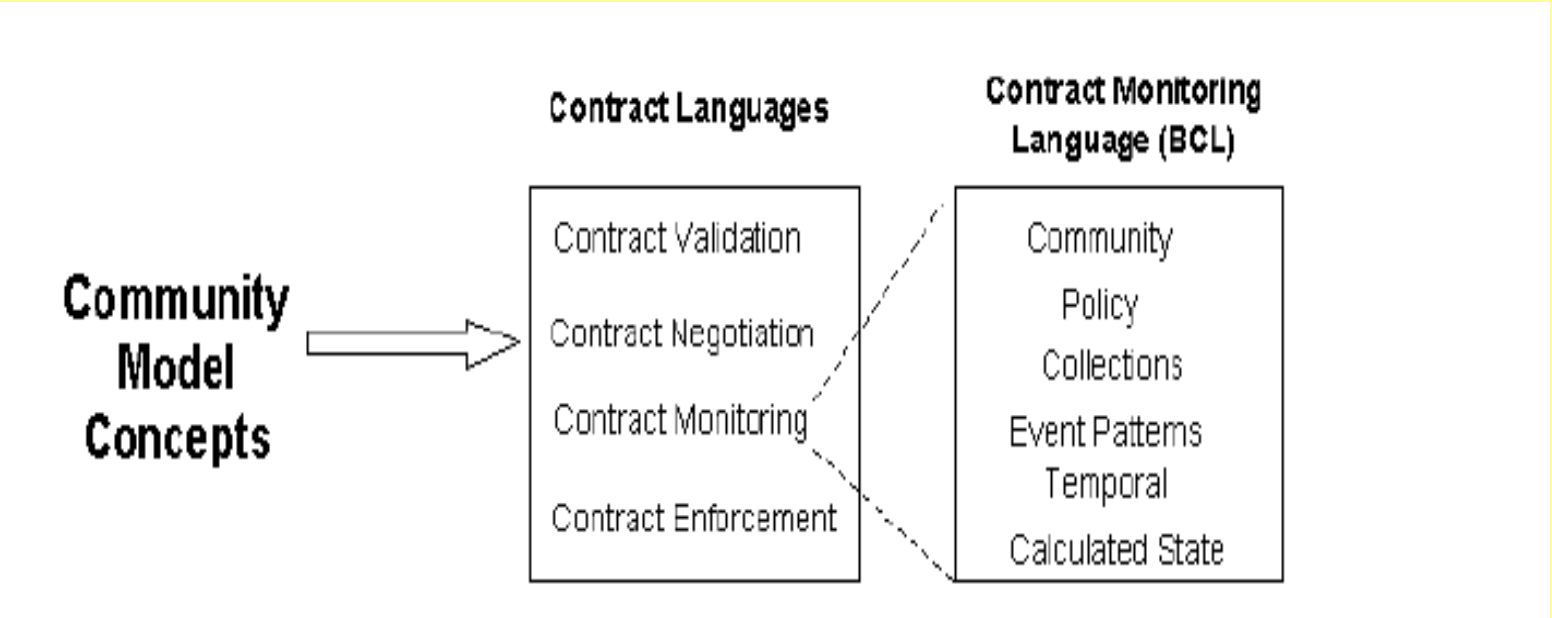
E1,E2—Enterprises, R_i—Right, O_i—Obligation
ME1—Manager of E1, ME2—Manager of E2

Monitoring and Enforcement of e-contracts using Finite State Machines [Molina-Jimenez et al, 2003] contd…

Mapping of events, conditions and operations of an e-contract into a FSM state



Business Contract Language

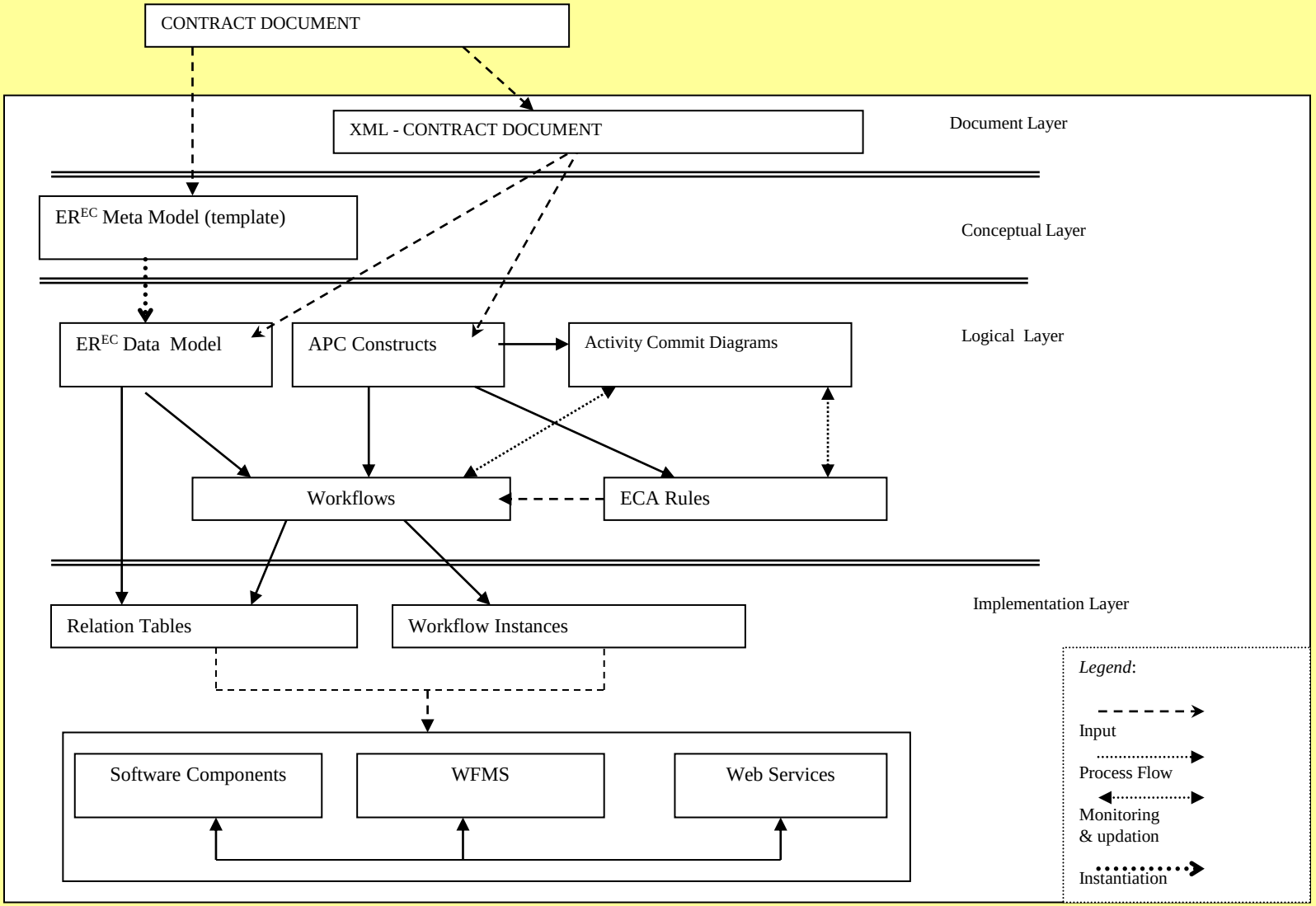


The Contract monitoring domain language

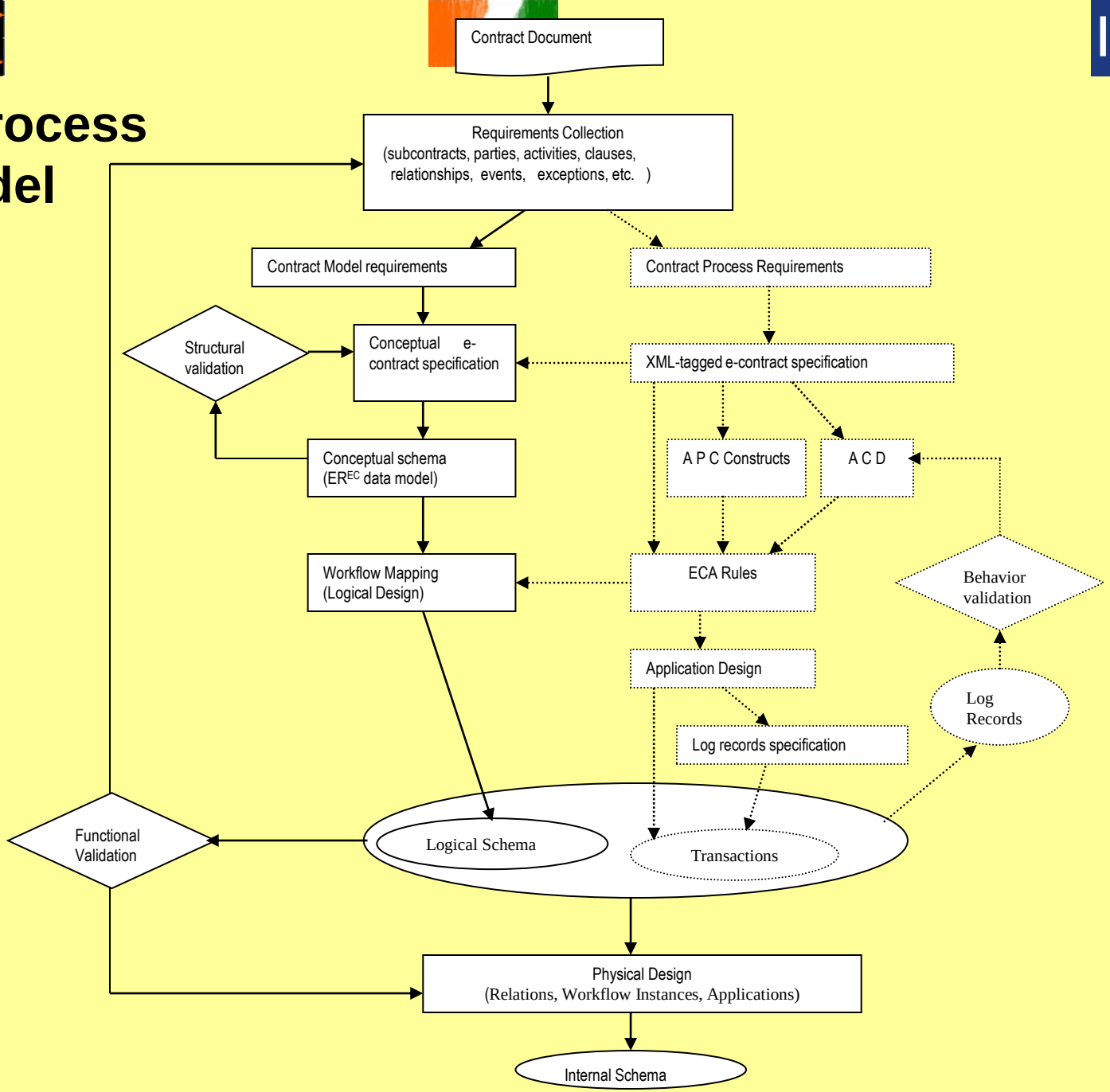
Contract Management

- Managing contract effectively requires a powerful semantic model and a generic management framework. If contracts are to be enforced automatically then the representation must capture the relevant semantics in full. [Bacon and Moody, 2003]

ER^{EC} Framework

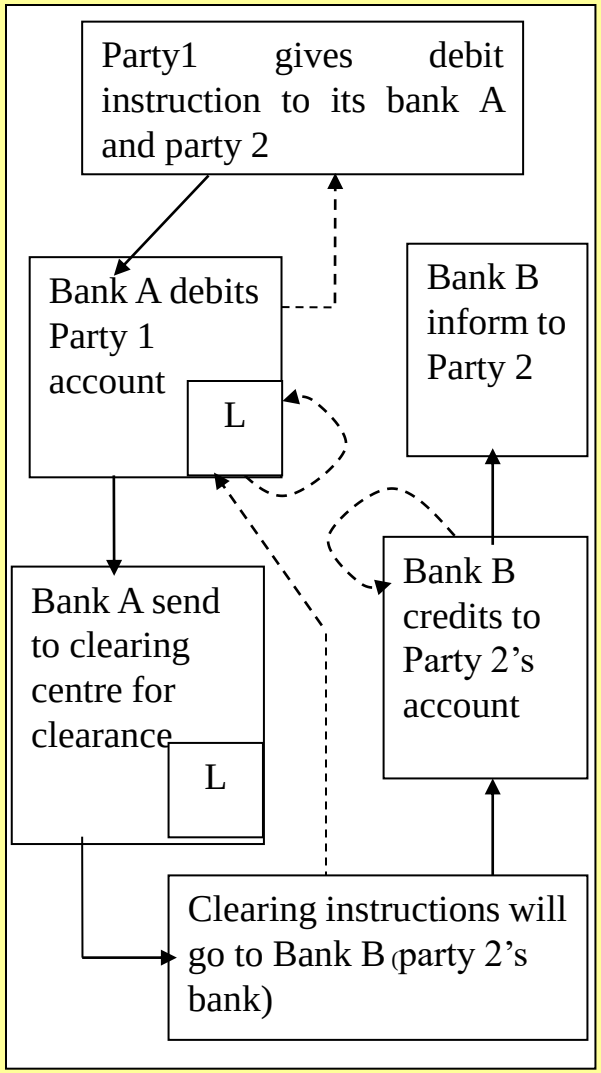


ER^{EC} Process Model

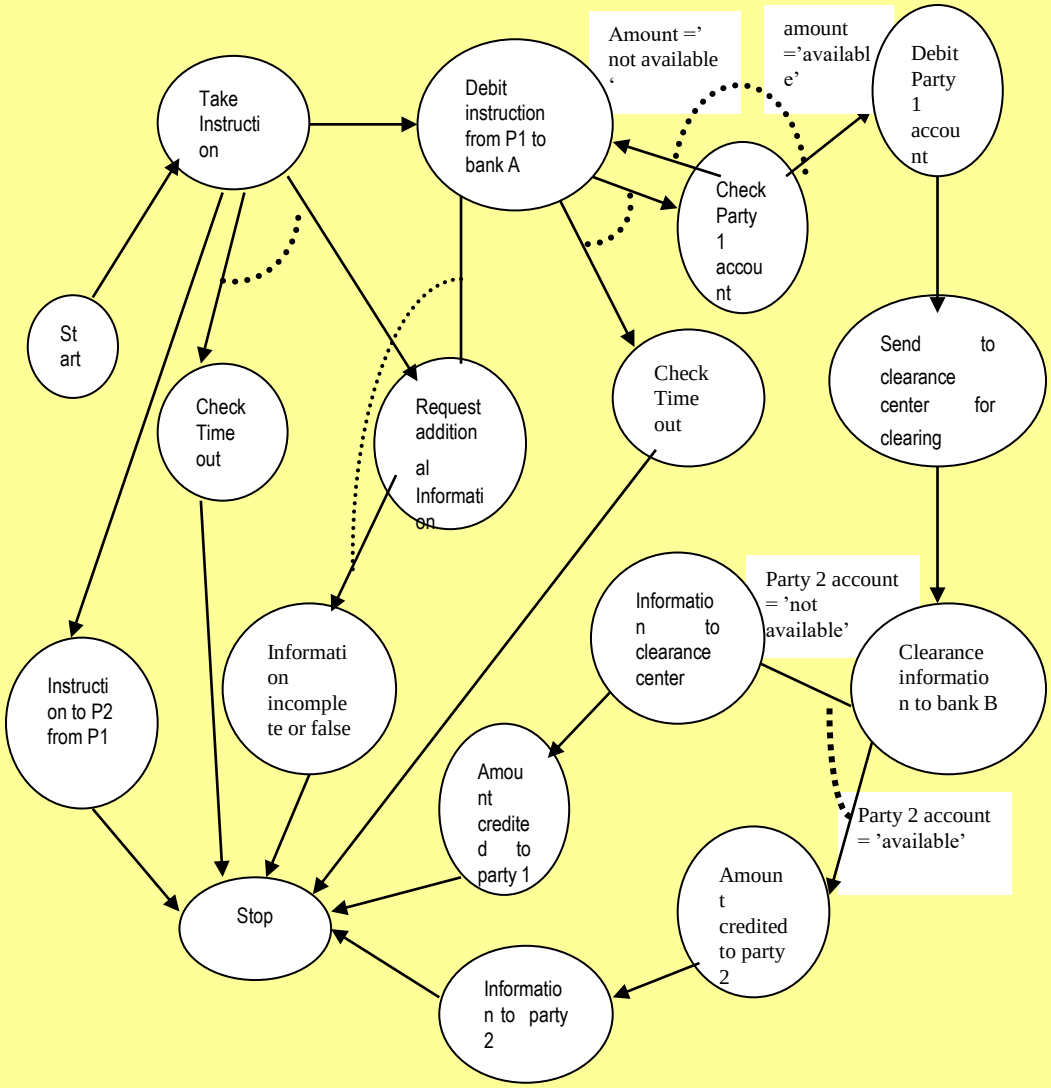


APC Specifications

Party	<Party> <Party Number> ..<Party Name >.. + </Party>
Activity	<Activity> <Activity Number> …<Description> …. <Start Date >… <End Date> …. < Previous Activity>… <Next Activity>…. <Parties Responsible>..</Parties Responsible> + <Clauses>…< /Clauses> + <Exceptions>…</Exceptions> + </Activity>+
Clauses	<Clauses> <Clause Number> <Description> <Activity Number>….<Party Number> + </Clauses>

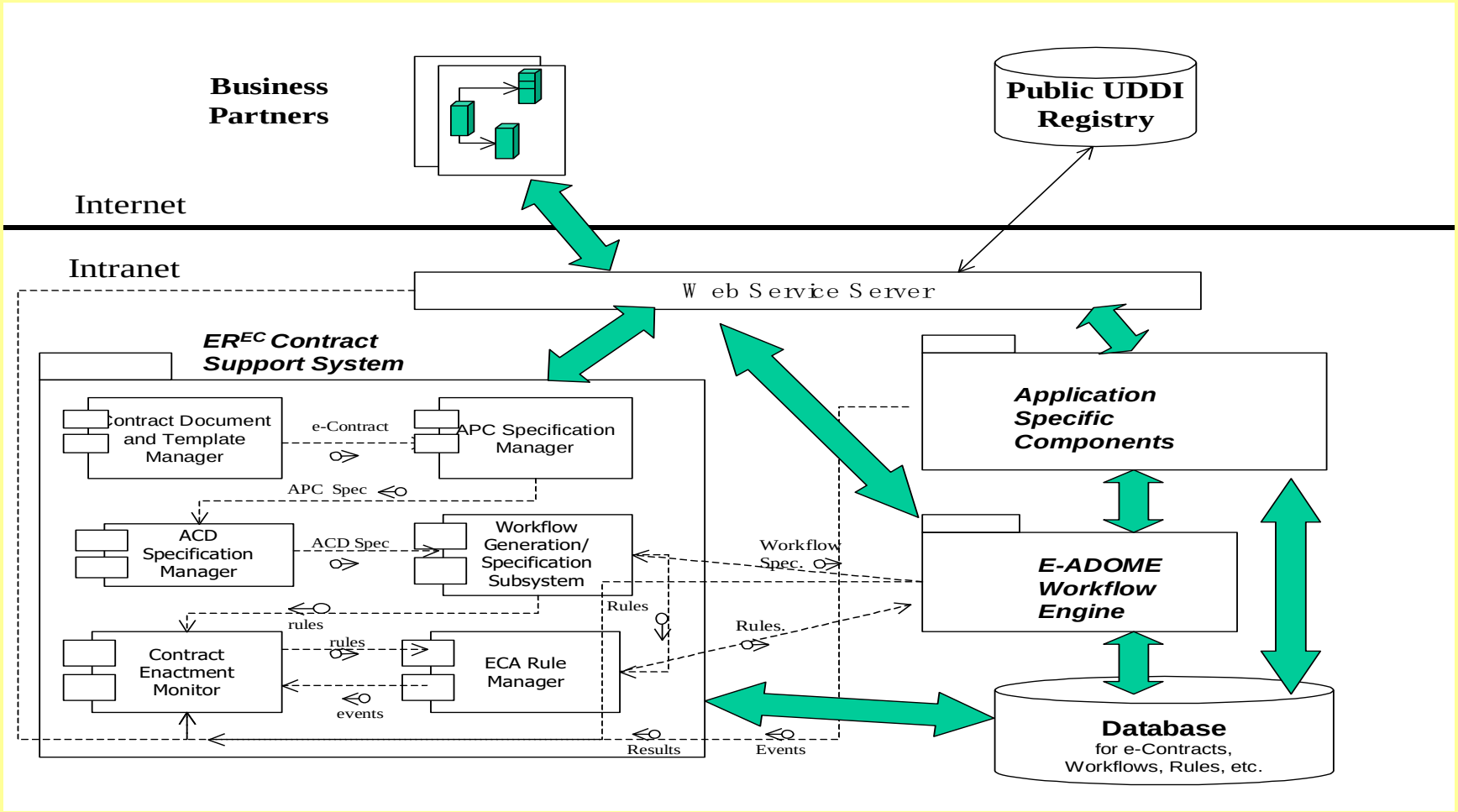


ACD for fund transfer activity



And-Or Graph of Event level Specification of Fund Transfer Activity

Implementation Architecture for ER^{EC} Framework

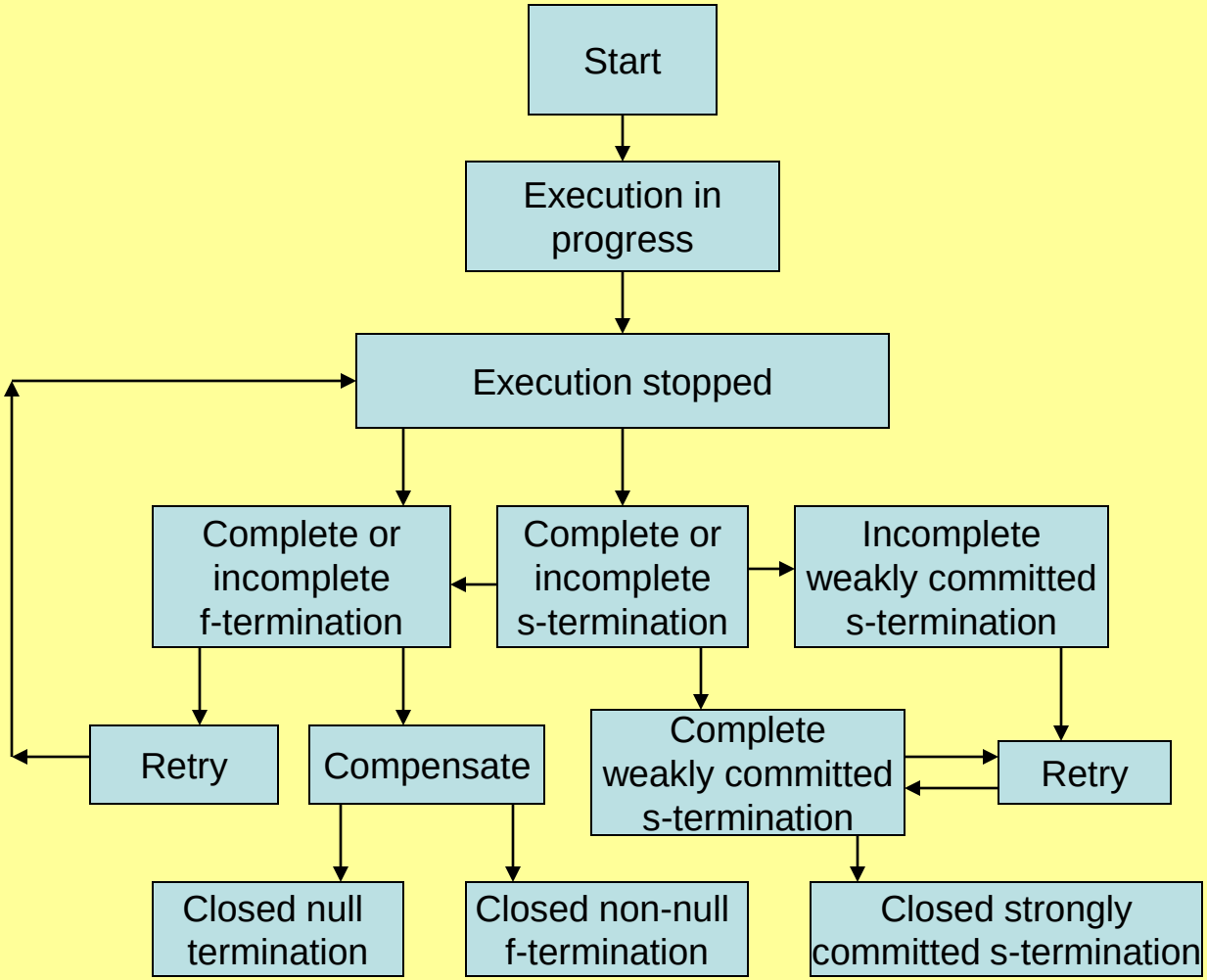


E-Contract Commitments

Goals of the e-contract commitment

- We believe that, to handle the complexity of a contract, an e-contract should reflect both the specification and the execution aspects of the activities at the same time, where the former is about the composition logic and the latter is about the transactional properties.
- Hence, the goals of an e-contract include precise specification of the activities, mapping them into deployable workflows, and providing transactional support in their execution.

Execution stages of an activity



E-Contract Evolution

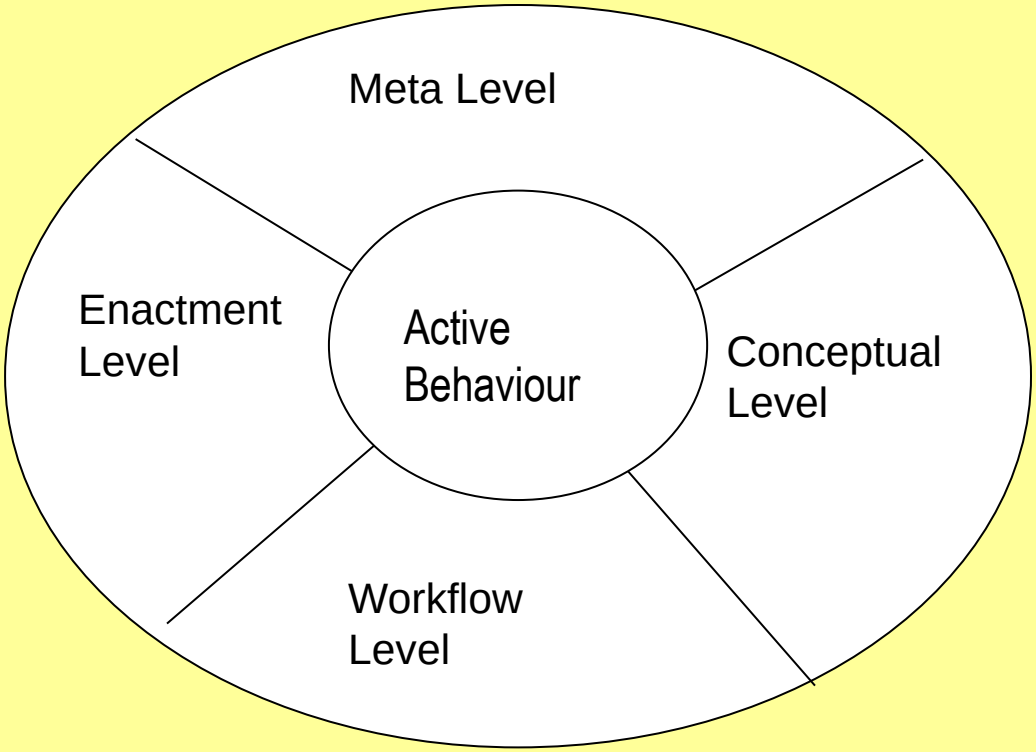
- Evolution of Business Environments
- Changing Market Requirements
- Involvement of multiple organizations
- Competition
- Changes in Government Policies and Laws
- Advancements in Technologies

Evolving Applications

- Two Kinds of Changes
  - Run-Time changes
  - Mini-World changes
- Exceptions
  - Expected exceptions
  - Unexpected exceptions

need of active behavior to synchronize the changes in business logic and business processes across different levels of conceptual/logical models.

Evolving Applications



Modeling active behaviour at various levels

Modeling Evolving Applications

- How to re-design the conceptual models (for instance, ER model)? How to synchronize the changes in mini-world and/or run-time environment to other levels?
- This calls for an iterative active methodology that constantly *monitors run-time environment and changes in real-world specifications to keep the deployed applications/processes current*.


E-contracts: Commercial Products

Some e-contracts Commercial Products

- **LaDorn Systems Corporation's e-Contracts software**
  - **complete solution for automating the entire procurement process**
  - **Features**
    - **Centrally track and manage contracts**
    - **Route contracts through approval cycle with e-mail notifications**
    - **Easily add modifications to existing contracts**
    - **Track contract compliance**
    - **Create solicitations using templates and pre-existing documents**
    - **Manage vendor information, history and status**
    - **Search for vendors by commodity code, business size, classification or LSDBE**
    - **Evaluate vendor and subcontract performance**
    - **Customized reports that can be exported, faxed or emailed**
    - **Built-in multi-level security**
    - **Interface with other financial and administrative systems**
  - **http://www.ladorn.com/econtracts.htm**

Some e-contracts Commercial Products contd...

- **Contract Management Track Software (CMTS)**
  - designed to simplify entire contract management process
  - http://www.cobblestonesystems.com/
- **ContractWeb**
  - enterprise contract management tracking solution
  - designed to streamline entire contract workflow process--from creation to completion
  - http://www.cobblestonesystems.com/

Open Problems

- Moving from existing voluminous document contract to executable e-contract
- Developing a generic meta-model or template models, to support domain specific e-contracts
- Integrated end-to-end solution from e-contract meta-model to e-contract deployment
- Evolving adaptive e-contracts (Spatio-Temporal)
- Developing e-contract Standards including standards for Conceptual modeling, architecture and deployment

Open Problems

- Tools and techniques to perform text analytics on e-contract documents to extract the logical specifications required for e-contract specification
- Supporting e-contract commitment. The monitoring, control and management aspects. Could be meta-workflow driven solution.
- Integrating payments with e-contract progress tracker and e-contract commitments
- Finally, deploying e-contracts using web=services and related technologies to support high volume e-contracts

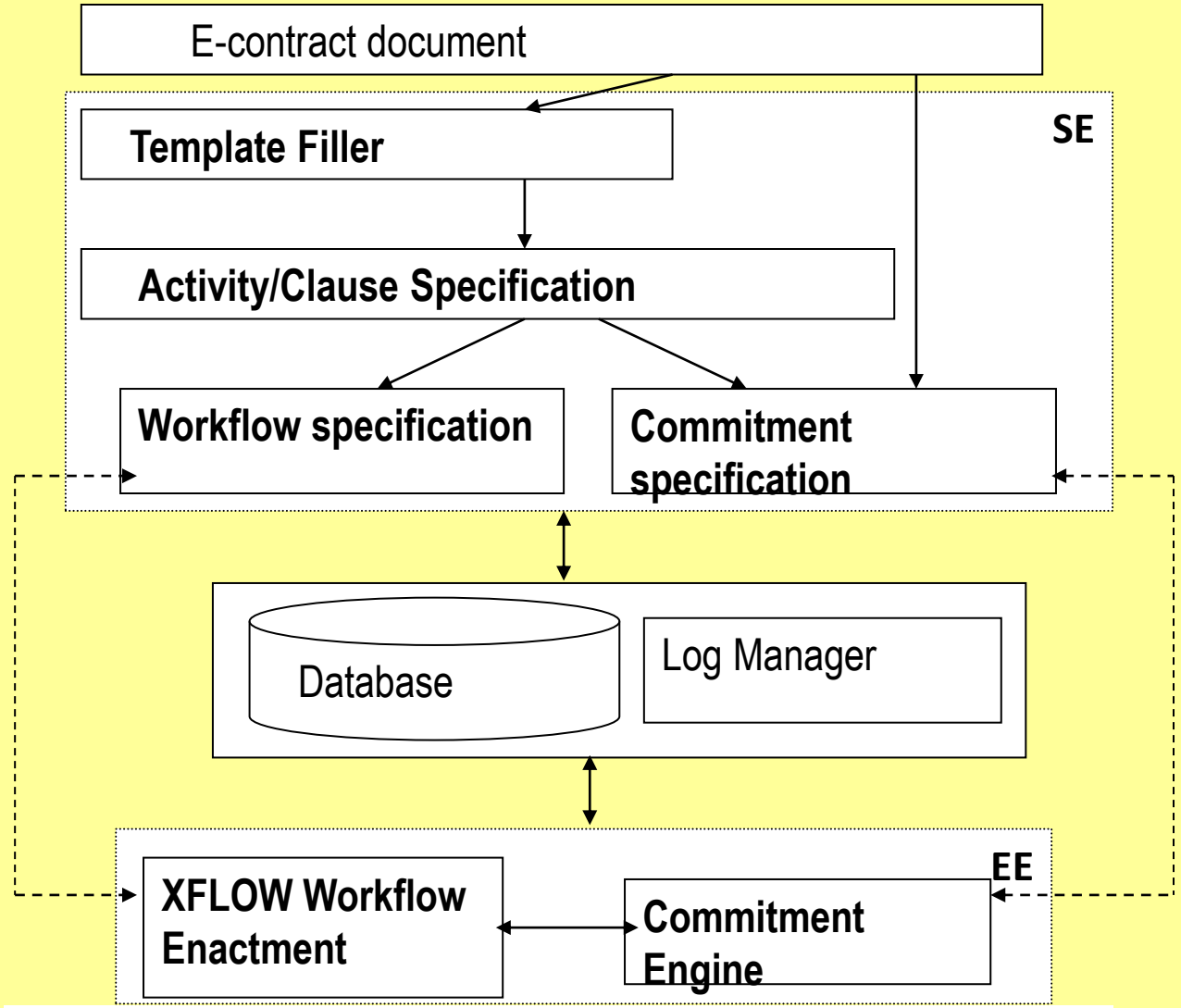


Fig. 1. E-Contract System

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Q & A

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Thank You

Investment E-Contract: Contracts

1. FI and Banks/agencies for accepting the Application Form and initial amount from Investors and sending the Application Forms to FI and collected amount to the account of FI (with FI's own bank).
2. FI and Banks (in some cases may be different from 1) for periodic payment of interest/ warrant/ dividend.
3. Among banks for inter bank funds transfer
4. Bank and investor – investor being the account holder of the bank
5. FI and Investors
6. Among the investors for the transfer of ownership
7. Agencies and banks for transfer of funds

ER^{EC} Model

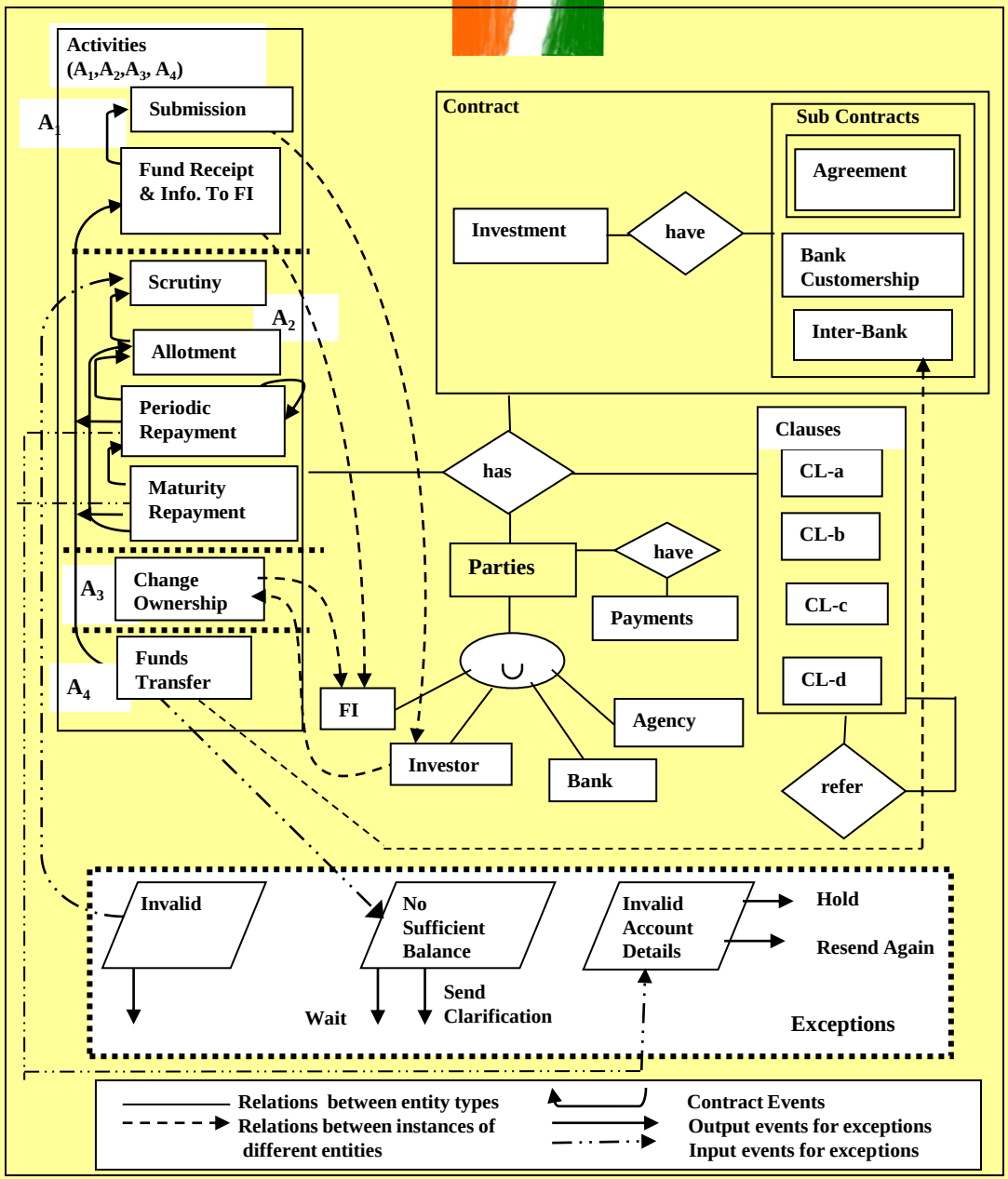


Investment E-Contract: Clauses

1.Who can invest (like say citizen of the country and or institutions), how they can invest (like say singly, jointly etc.)
2.Minimum Amount, Maximum Amount and Other restrictions Maturity Period
3.Promise of return, mode and periodicity of interest payment etc.
4.Other conditions like whether Transfer of ownership allowed, Pre-mature withdrawal allowed or not, reinvestment in other schemes allowed or not etc. and penal clauses like payment of additional penal interest in case the interest is not paid in time.

Investment E-Contract: Activities

Activity FI	Activity Investors
1. **Issuing notification for bonds/ security** 2. **Entering into an agreement with banks/agencies for acceptance of application forms and amount.** 3. **Receive Application forms and funds, scrutinize applications, pass accounting entries, allot bonds/ securities to investors, return the amounts for rejected applications and unallotted amount, issue bonds and certificates, send acceptance notifications to holding agencies and investors, periodically pay the promised interest, repay or reinvest in new scheme, etc.**	1. **Submit the signed and completed application and pay the amount.** 2. **Get notification** 3. **Hold the Bond/Security till maturity or carry out allowed operations like Transfer, pre mature withdrawal etc** 4. **Tally the periodic interest received**
	Activity Bank
	1. **Receive Application Form and Amount** 2. **Send Applications to FI and collected Amount to FI's Bank** 3. **FI's bank will credit the amount collected to FI's Account** 4. **FI's Account will be debited for periodic interest and repayment, the amount to be transferred to different bank accounts.** 5. **Transfer the interest and amount received to the investor's account.**



Investment E-Contract: Rules

Rule 1
Rule_Name **: Allot_Bonds_To_Investors**
Triggering_event **: Amount_Received and Application_Scrutiny_Successful**
Condition **: Decide upon the Bond Allocation policy.**
Action **: Return the remaining Amount if the Face_Value of Bonds allotted is less than paid amount.**
Resultant_Event **: {Allot Bonds, Return Amount, Inform_Depository}**
Suppose that investor has applied for Bonds of face value say X and he has paid amount Y (>X) then the amount (Y-X) is returned. The information is sent to the depository.
Rule 2
Rule_Name **: Pay_Interest**
Triggering_event **: Due_Date**
Condition **: There should not be any hold on interest payment**
Action **: Calculate the interest payable and credit it to the investor's Account**
Resultant Event **: {Calculate Interest Due, Amount_Transfer, Bank_Transfer}**
The interest will be calculated and the amount will be transferred to the Account of the Customer
Exception **: Not able to credit – Incorrect_Account_Info, Interest cannot be paid**

FMS Contract

- Financial Messaging Solution – standard for financial messages among banks and between banks.
- A contract between software developer, service provider, and the participating banks.

FMS Contract

- **A modularized Web enabled software enabling financial messaging among the participating banks with flexible architecture.**
- **Template Builder to support flexible definition of messages in the standard format.**
- **Directory services for maintenance of branch directory, network configuration, etc.**
- **Secured messaging and routing based on store and forward principles governed by push technology providing Smart Card based access. Messages will be secured via standard encryption and authentication services conforming to ISO standards.**
- **Messages can be clubbed and exchanged as a batch of files.**
- **Complete auditing, logging, time-stamping and warehousing of messages and periodic computation of charges and billing of the services offered to the participating banks.**

FMS Contract

The contract document is 200 pages

Involves executing number of activities in synchronized manner

Typical Activities

1.Identify the deliverables of the contract. It will involve a subcontract between the participating banks and software and hardware vendors.

2.The work completed is required to be monitored - Progress Monitoring

3.It has to be inspected for correctness – Testing Activity

4.Depending upon the successful completion, the payments instructions to the banks are generated. – Payments

"Either Purchaser or Contractor can identify the need for change on the accepted deliverables. [Clause CL-a]

If the Purchaser identifies the change requirement, then Purchaser will raise Request for Change (RFC) by filling the Change Management Request form. Its format will be provided by the Contractor. It will essentially cover Change Request Description, Requested Date, Priority of the request (i.e. Very Urgent, Urgent, Normal etc.). The priority will be assigned by the Purchaser Project Manager. [Clause CL-b]

On receiving this request Contractor will allocate a CMR number to the request and will notify it to the Purchaser. The contractor will then evaluate the need of this change with respect to Priority, Feasibility of the change, and Impact on time frame and cost. The contractor might ask for relevant clarifications regarding the change request. It is the responsibility of the purchaser to provide the clarification in time. The Contractor will place the results of evaluation to Purchaser. [Clause CL-c]

The Purchaser can approve/disapprove the change requests after seeking the relevant clarifications on the evaluation from the contractor. In case the change is approved then the Contractor will schedule the changes based on priority. The contractor will then make the necessary changes and release them to Purchaser for acceptance. The purchaser will carry out the acceptance and provide the acceptance certificate. The Change Management Form will be recorded with the result raised change request, who has incorporated the change, date of release to Purchaser.[Clause CL-d]*"*

Example: FMS-Taxes&Payments

*"Subject to any deductions of tax at source, if applicable, from the contract price as per **clause A** of **schedule A** of the Contract, the CONTRACTOR shall be entitled to receive the Contract Price in the following manner :*

(1)All the payments shall be released directly by the PURCHASER to the CONTRACTOR

(2)**The initial advance payment and payments against the delivery certificates and final Acceptance Certificates as referred to in **Para B** of **schedule A** of the contract, shall be released on completion of each milestone as indicated in the table of payment in **schedule B.

*(3)All the payments will be made by the purchaser only after satisfying about the satisfactory completion of each milestone as stipulated in Systems Requirements Specifications (SRS) Document referred to in **Schedule B**, of the Contract by the PURCHASER .*

(4) ...

Activities of each party for the *Change Management*

A: Application Software Developer

[A-1]. Examine the Request. Seek clarifications and replies

[A-2] Assign Change Management Request (CMR) Number

[A-3] Accept or Reject the change

[A-4] Carry out changes

[A-5] Receive Payments

B: Banks

[B-1] Identify the Change Management Request

[B-2] Clarifications and Replies about changes

[B-3] Examine the impact of acceptance of change

[B-4] Upgrade Hardware/Software, if necessary

[B-5] Acceptance of Upgrades

[B-6] Acceptance of the changes

[B-7] Payments to different parties like Vendors/ Service Provider/Application

C: Service Provider

[C-1] Identify the Change Management Request

[C-2] Clarifications and Replies about changes

[C-3] Examine the impact of acceptance of change

[C-4] Upgrade Hardware/Software, if necessary

[C-5] Acceptance of Upgrade

[C-6] Acceptance for the changes

[C-7] Receive Payments

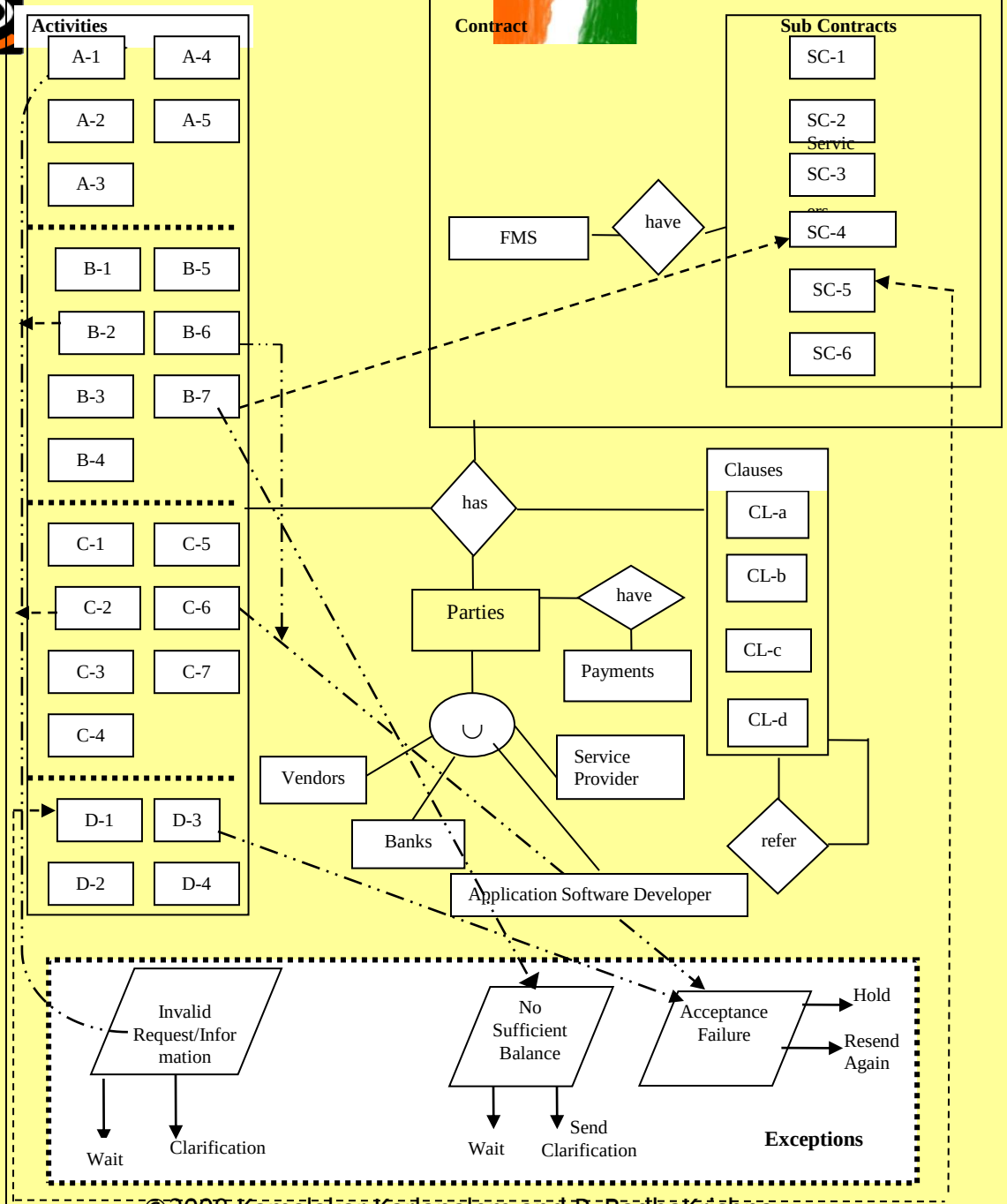
D: Vendors

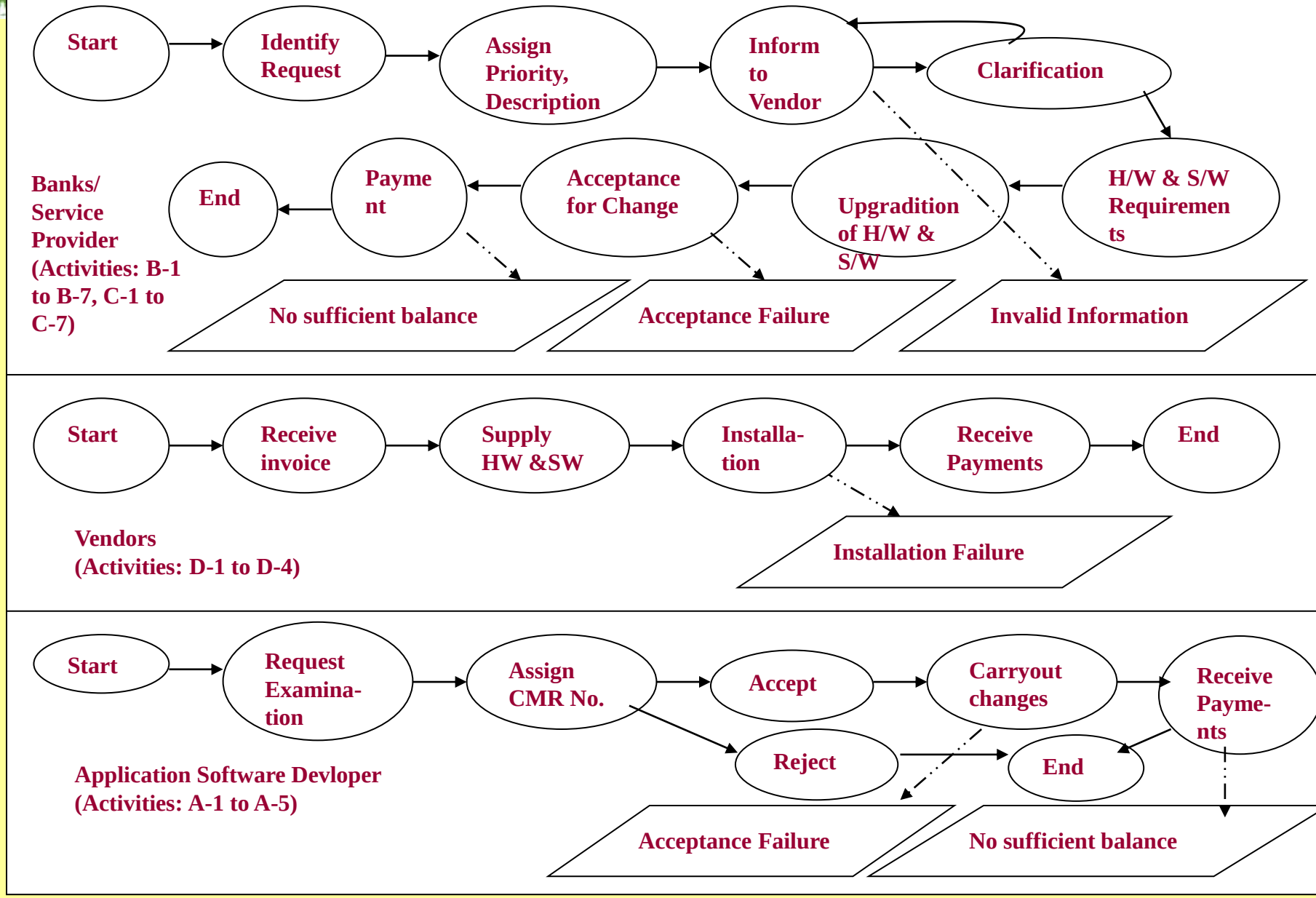
[D-1] Receive request for Hardware/Software

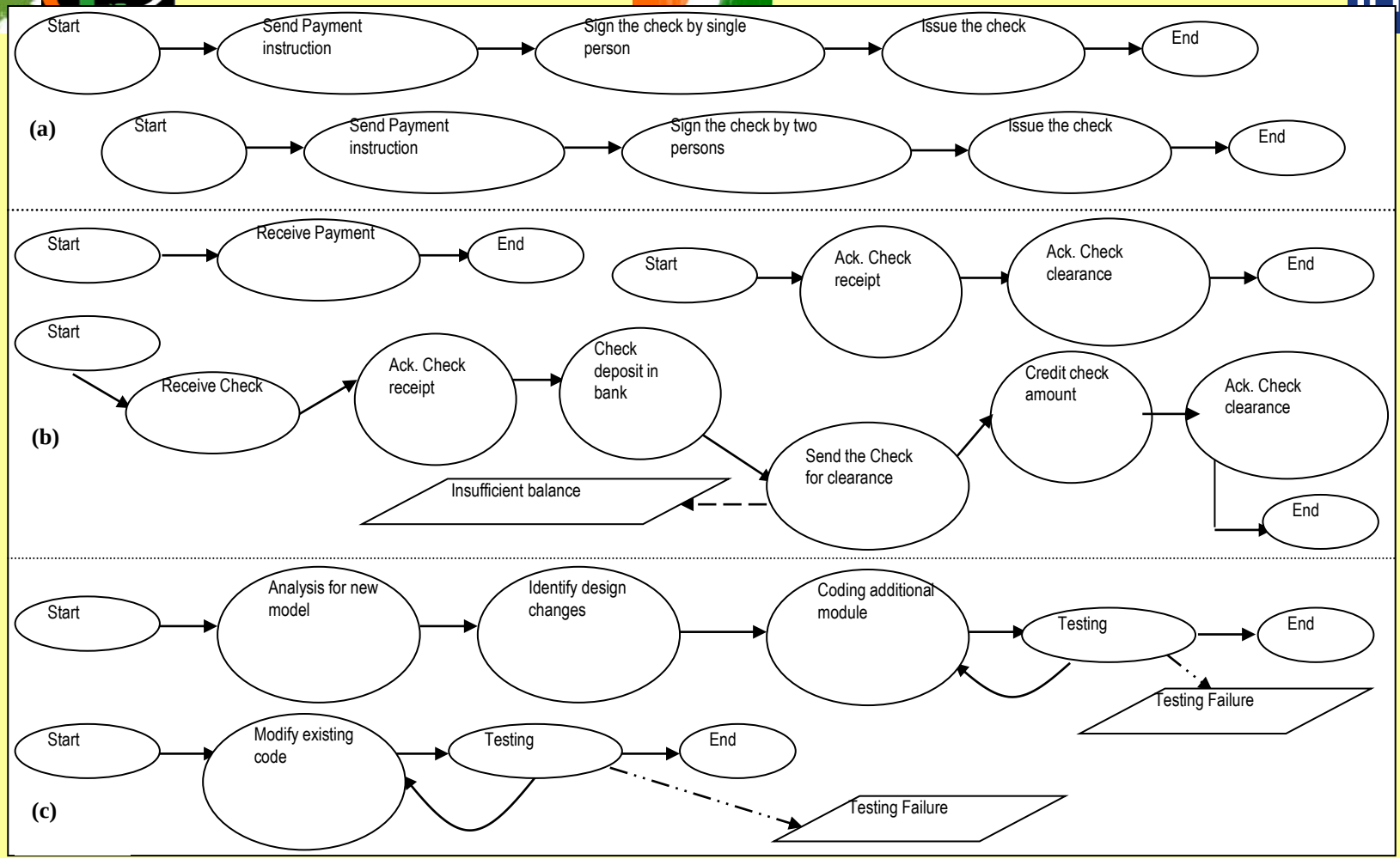
[D-2] Supply Hardware/Software

[D-3] Installation

[D-4] Receive Payments







(a) Parametric workflows for ‘payments’ (b) Workflow views for ‘Receive Payments’ (c) Dynamic workflows for ‘carryout changes’

Textile Value Chain Contract

(1) STC and Mills

(2) STC and Weavers

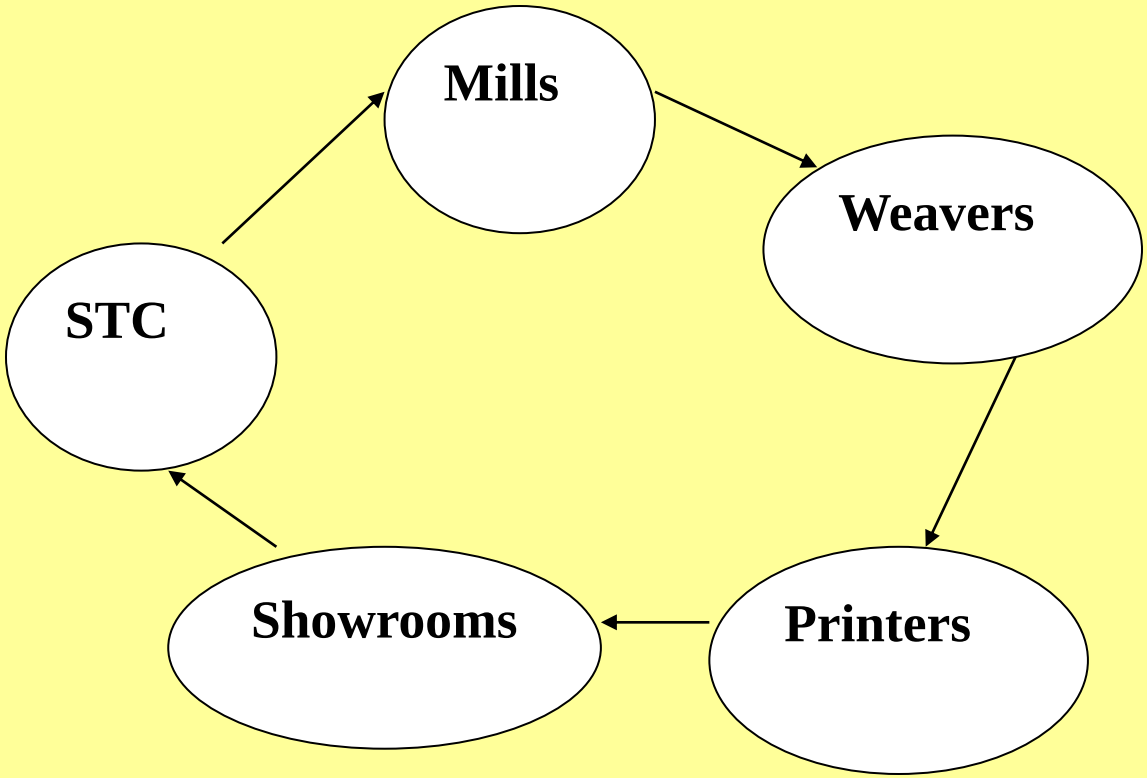
(3) STC and Printers

(4) STC and Showrooms

(5) STC and Institutes/organizations

(6) Interbank

(7) Bank Customership



……

Terms of Payment: 100% payment will be made against delivery by cheque after inspection and acceptance of the material at our stores.

"When the material is ready for dispatch", before supplying the material, please arrange to send three copies of Performa invoice indicating D.C. No. & Date in order to keep the demand draft ready.[Clause CL-a]

……..

Liquidated Damages:

A) Failure to supply the goods by the time specified on the order will make the supplier liable to an unconditional liquidated damage of ½% (half percent) per week subject to a maximum of 10% (Ten Percent) of the price of the goods in arrears at the discretion of the STC.[Clause CL-b]

B) The purchaser shall have the right to cancel either wholly or in part the portion of the contract which is yet to be executed by supplier in case the delivery is not in accordance with the time specified in the order. [Clause CL-c]

……..

Jurisdiction: All questions, disputes of differences arising under, out of or in connection with the contract shall be subject to the exclusive jurisdiction of the court within the local limits of whose jurisdiction the place from which the purchase order is issued, is situated.[Clause CL-d]

……..

Quality: All goods and works must conform to the specifications quoted on the order and are to be strictly in accordance with approved samples of designs. Goods supplied are subject to inspection by our authorized representatives and the inspector has right to reject the goods of conforming to our specifications.[Clause CL-e]

……....

Inspection: All goods and works are subject to our inspection. Inspection, either at your works or delivery as agreed will be carried out. The decision of our officer nominated/authorized by the GM, Materials is final. Rejected goods will be returned to the suppliers at his cost including freight on original shipment.[Clause CL-f]

……

Activities of each party for the *Textile value chain contract*

A: STC

[A-1]. Requirement analysis,
[A-2] Inventory management
[A-3] Estimation of raw material (yarn)
[A-4] Purchase order to Mills
[A-5] Shipment of raw material to weavers
[A-6] Shipment of weaved material/gray cloth to Printers along with required design specifications.
[A-7] Shipment of finished goods to showrooms/Institutions/Organizations
[A-8] Training to weavers on modernization of new machinery/tools

B: Mills

[B-1] Receive the invoice
[B-2] Supply raw material

C: Weavers

[C-1] Receive the raw material,
[C-2] Process material
[C-3] Supplying the weaved material/gray cloth to STC/Printers

D: Printers

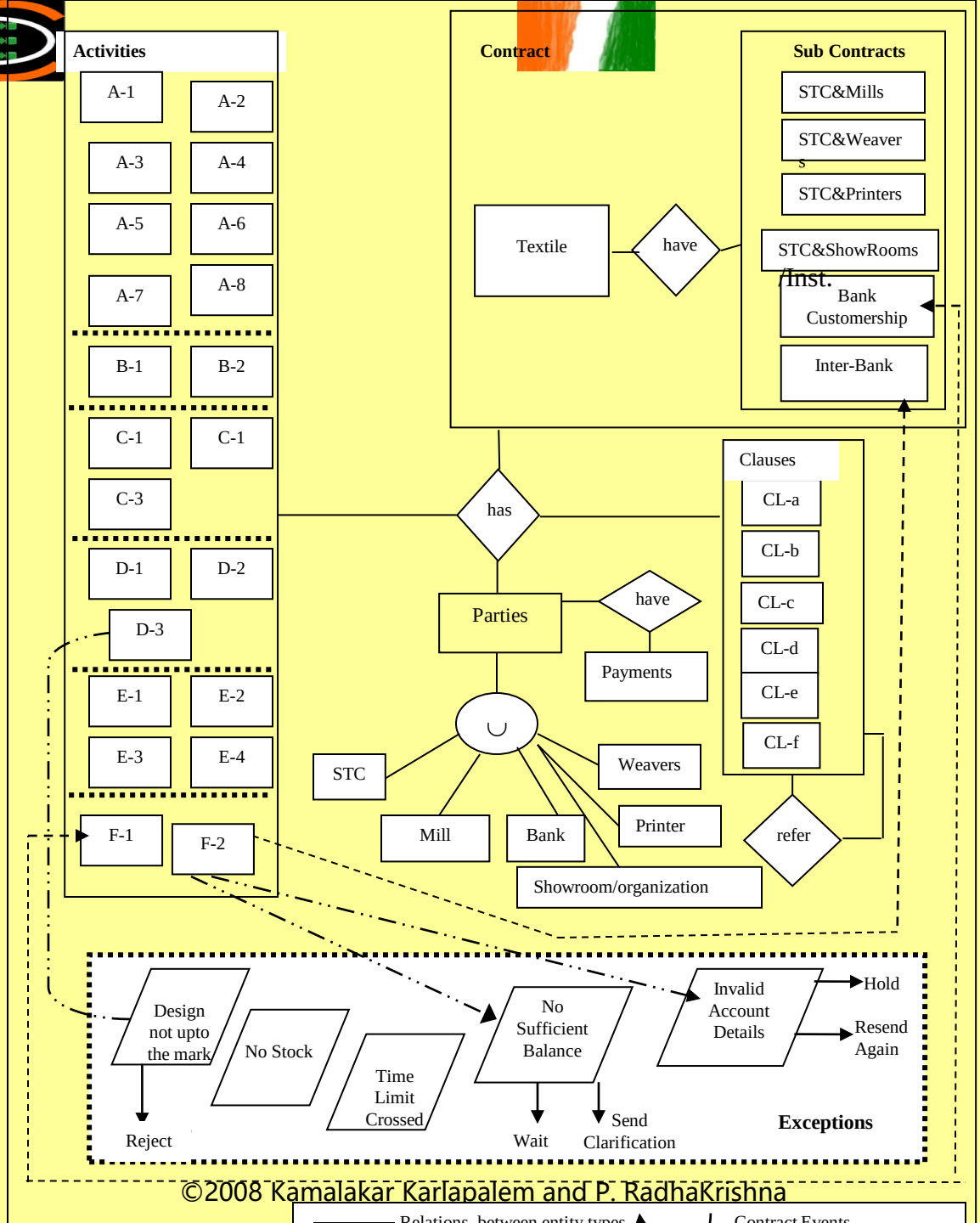
[D-1] Receive the weaved material
[D-2] Process (dying and printing) the material
[D-3] Shipment of finished goods to STC

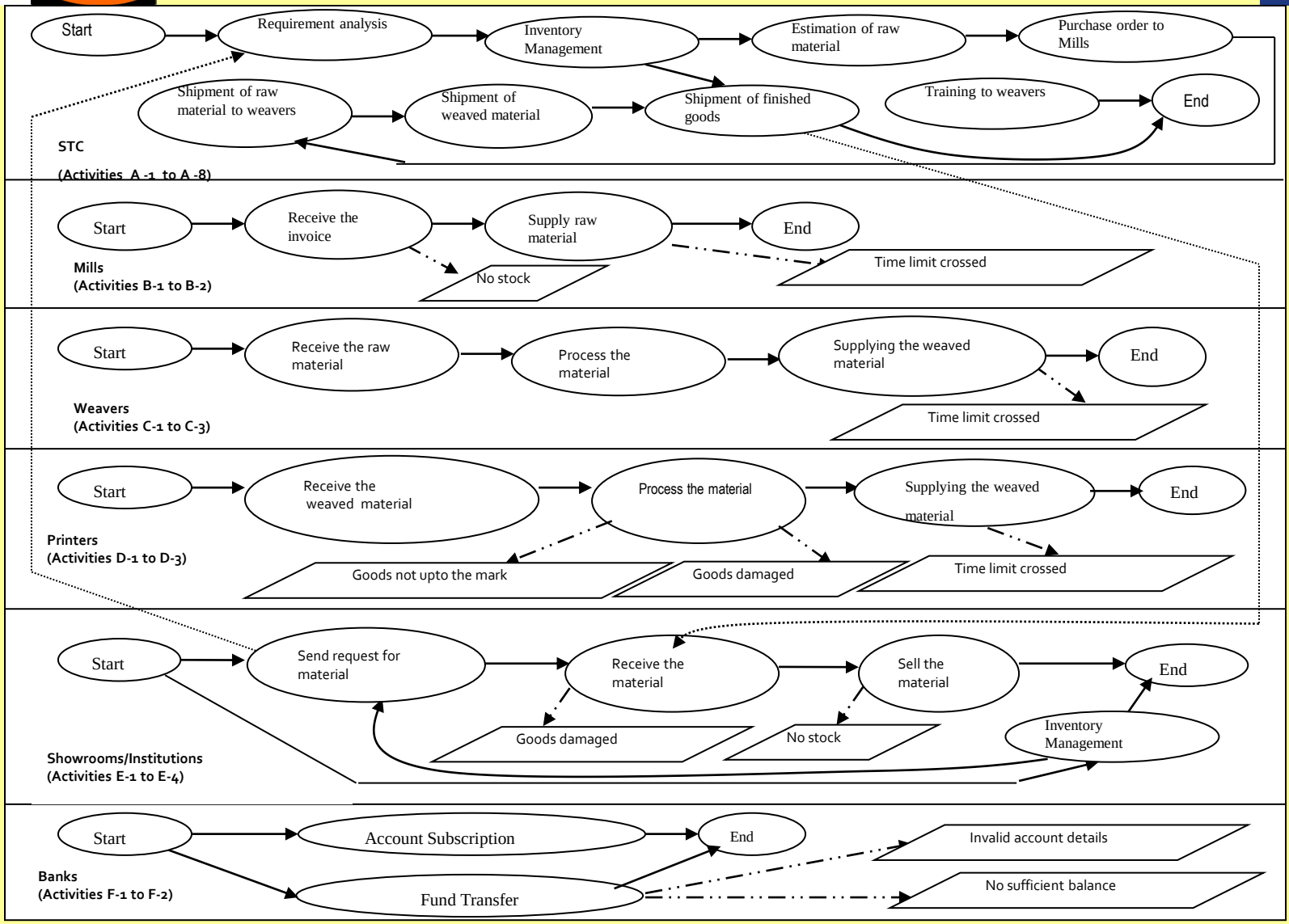
E: Showrooms/ Organizations

[E-1] Send the request for material (cloths)
[E-2] Receive the material
[E-3] Sell the material
[E-4] Inventory management in case of showrooms

F: Banks

[F-1] Account Subscription (customership)
[F-2] Fund Transfer

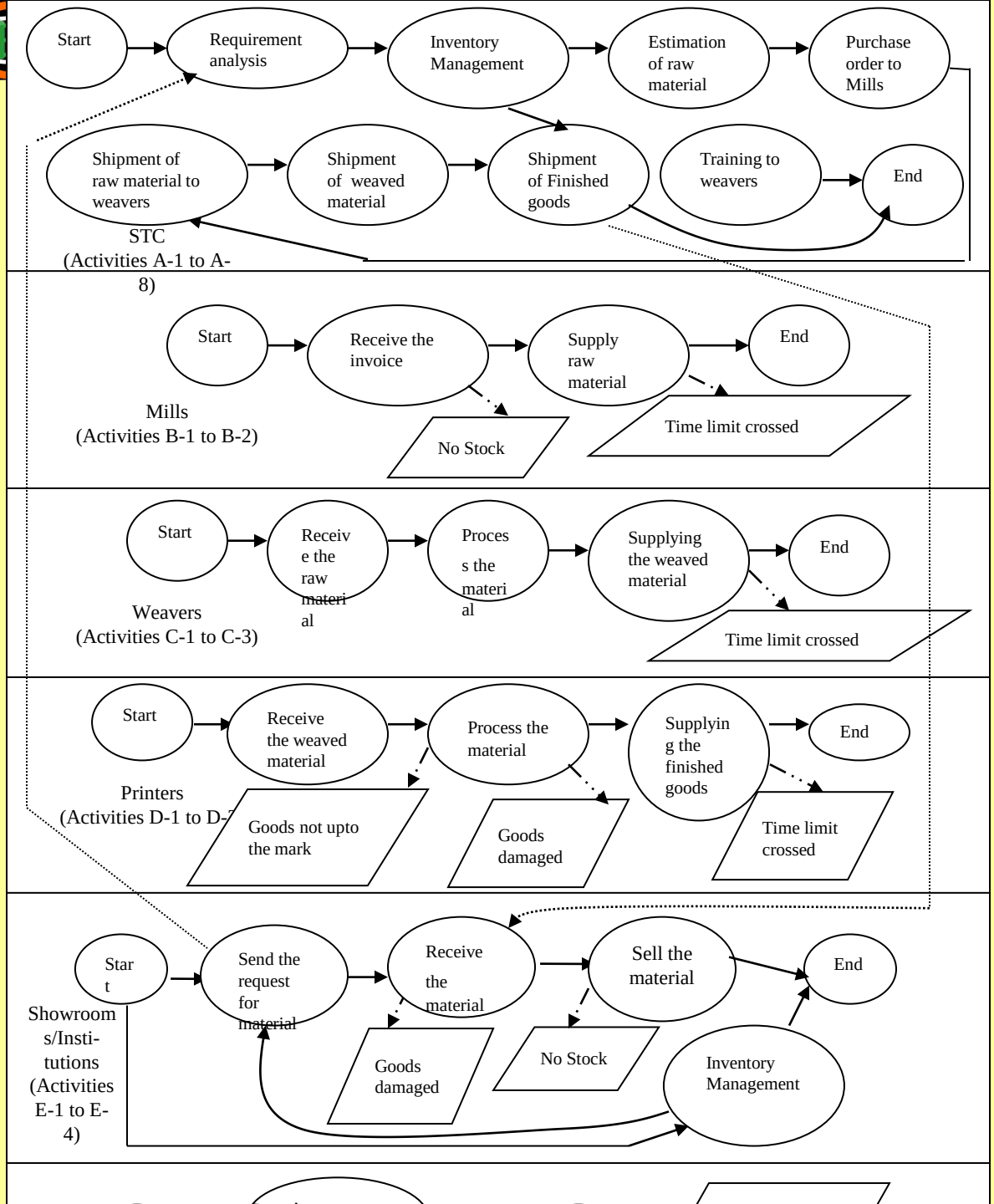




Workflow for e-contract 'Textile Value chain'

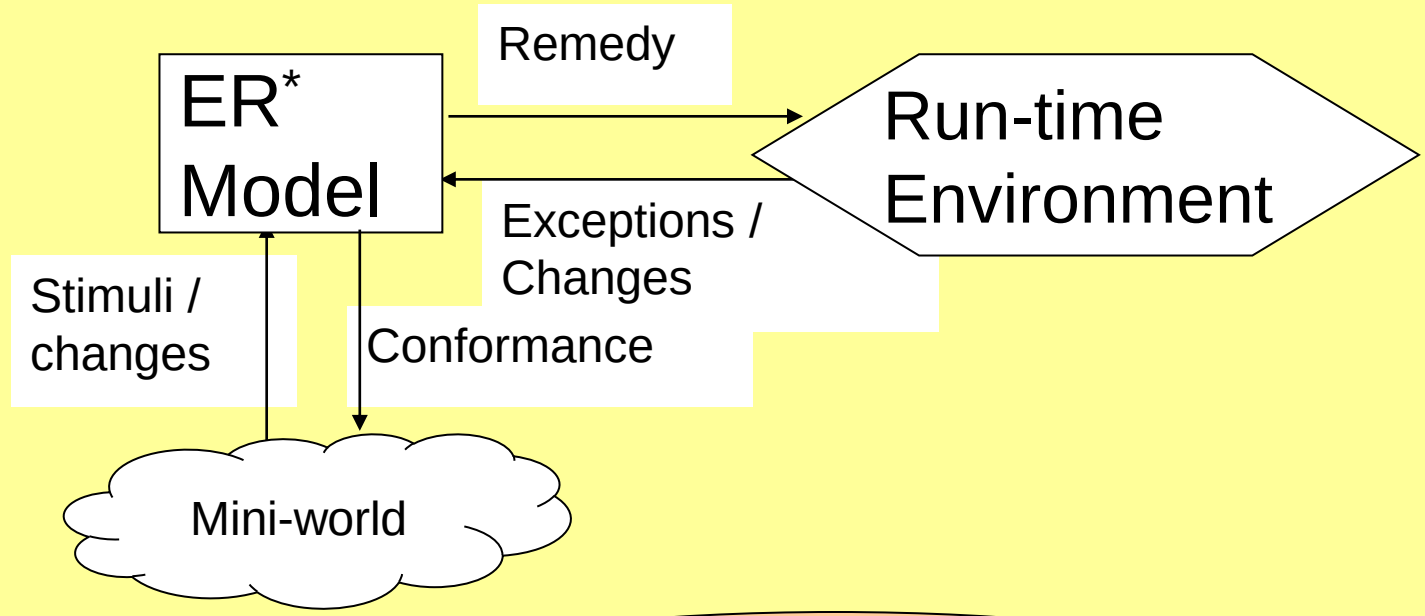
Contract Monitoring using Rules

- Carefully look into all the statements in the contract document, especially the clauses.
- Extract statements with phrases such as “if then else”, “but”, “contract violates” and other user specified phrases.
- Prepare groups of statements in such a way that each activity/task is associated with a particular group.
- Identify the set of events and actions for each group of statements, and translate them into “Event-Condition-Action (ECA)” Rules.
- List the exceptions associated with each ECA Rules.
- Show the rules using parallelograms in the ER^{EC} model.
- Link the related entity instances of *activities*, *clauses* and *exceptions* entities in the ER^{EC} schema.


Start
Requirement analysis
Inventory Management
Estimation of raw material
Purchase order to Mills
Shipment of raw material to weavers
Shipment of weaved material
Shipment of Finished goods
Training to weavers
End
STC
(Activities A-1 to A-8)
Start
Receive the invoice
Supply raw material
End
No Stock
Time limit crossed
Mills
(Activities B-1 to B-2)
Start
Receiv e the raw materi al
Proces s the materi al
Supplying the weaved material
End
Time limit crossed
Weavers
(Activities C-1 to C-3)
Start
Receive the weaved material
Process the material
Supplyin g the finished goods
End
Goods not upto the mark
Goods damaged
Time limit crossed
Printers
(Activities D-1 to D-7)
Star t
Send the request for material
Receive the material
Sell the material
End
Goods damaged
No Stock
Inventory Management
Showroom s/Insti- tutions (Activities E-1 to E-4)

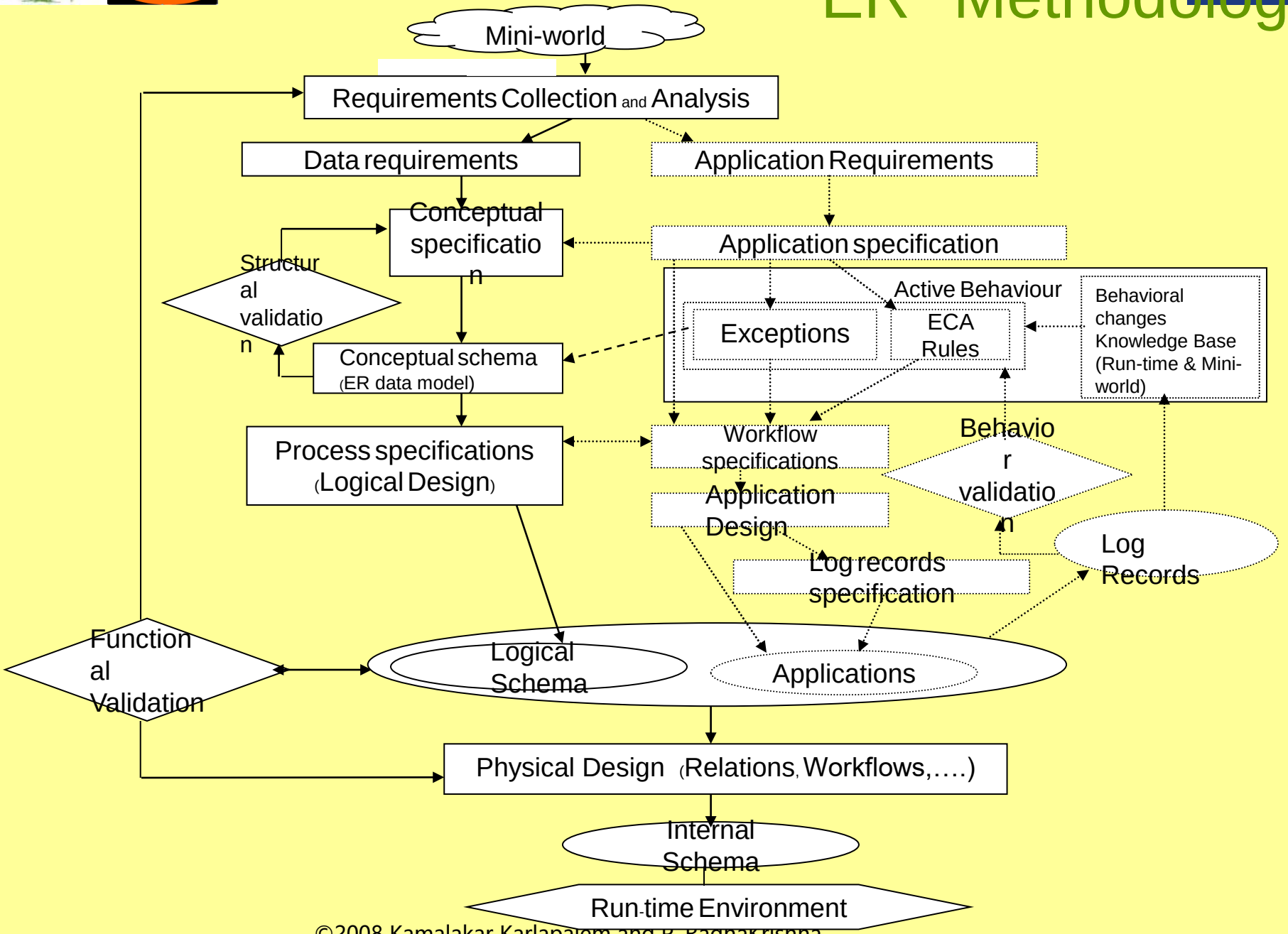
Evolving E-contracts

Conceptual modeling framework

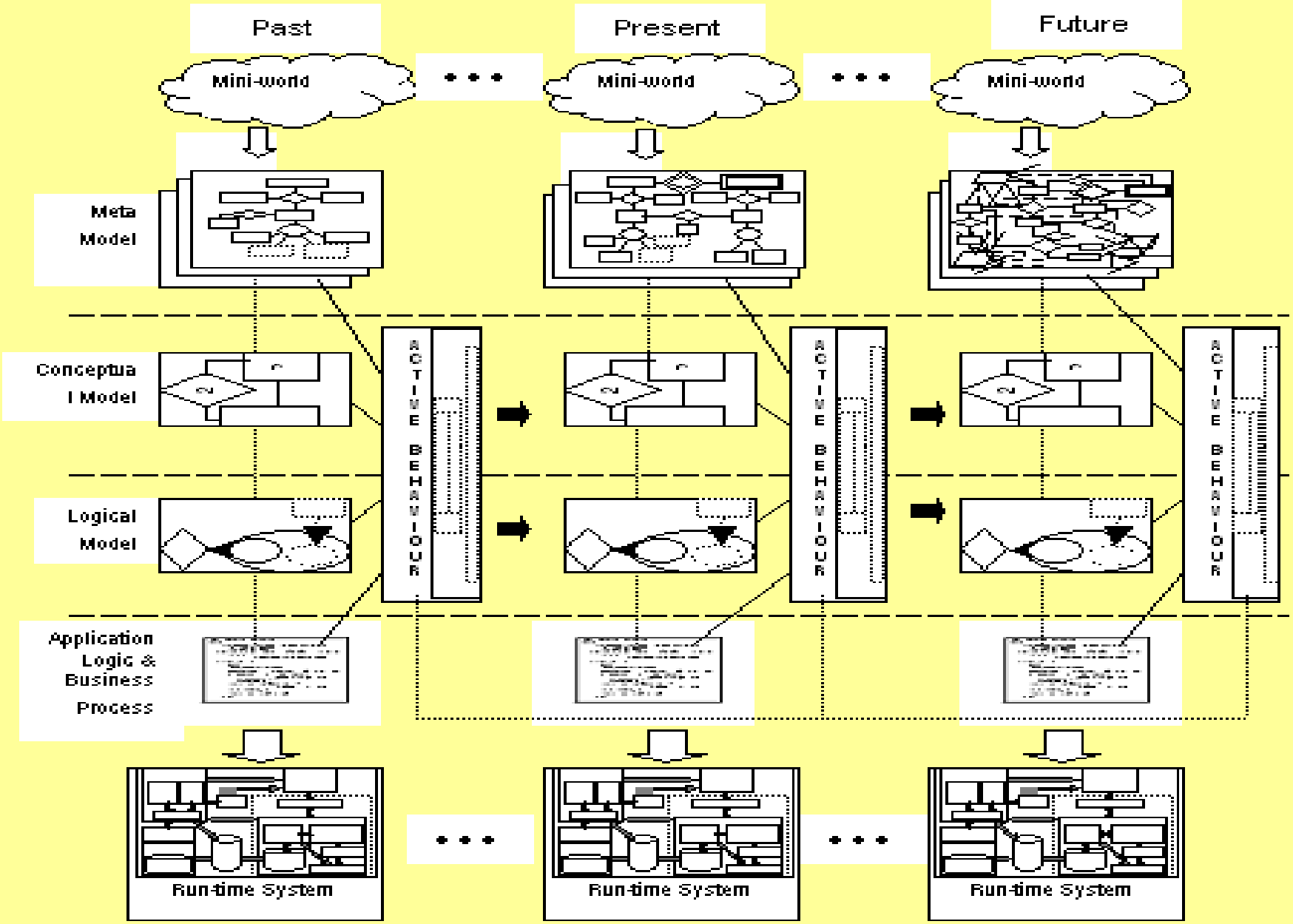


Modeling of applications requires
both human and system driven specification
and deployment in order to handle
the active behavior of applications.

ER* Methodology



ER* Methodology for Evolving Applications



ER* Methodology for Evolving Applications

A two-way perspective of actively evolving conceptual models:

i) across the time domain (present, past and future)

ii) at various levels (meta, conceptual, logical and application level).

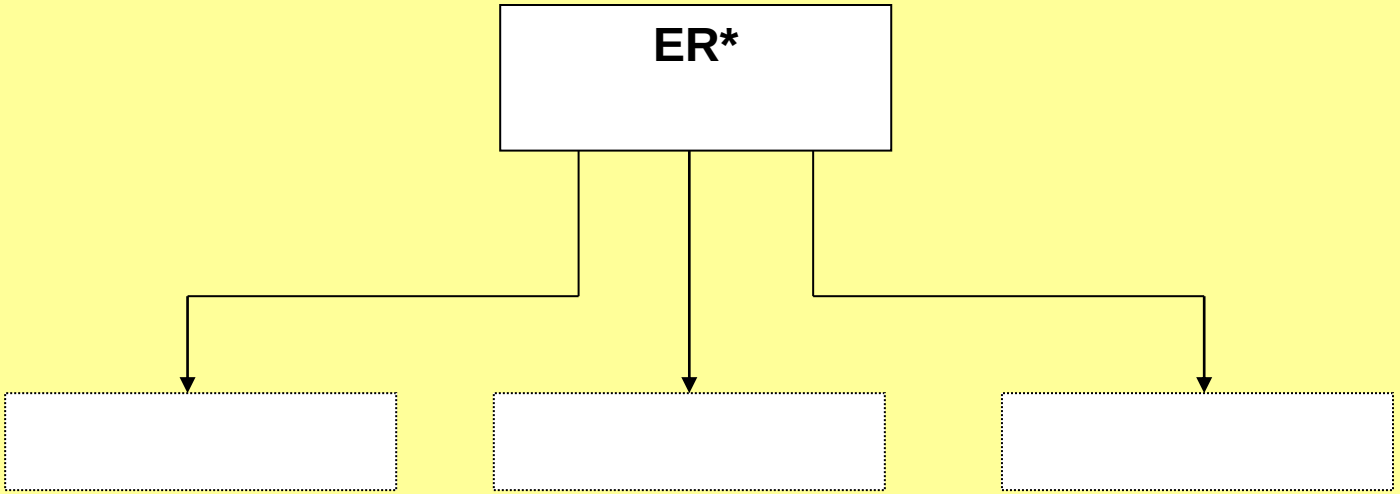
Approaches for evolution from present to future

- Template selection
- Operator assisted evolution of ER models
- Complete re-design of ER models (from scratch)

The template selection mechanism manifests itself as a ER* methodology problem .


Template Selection Driven Evolution

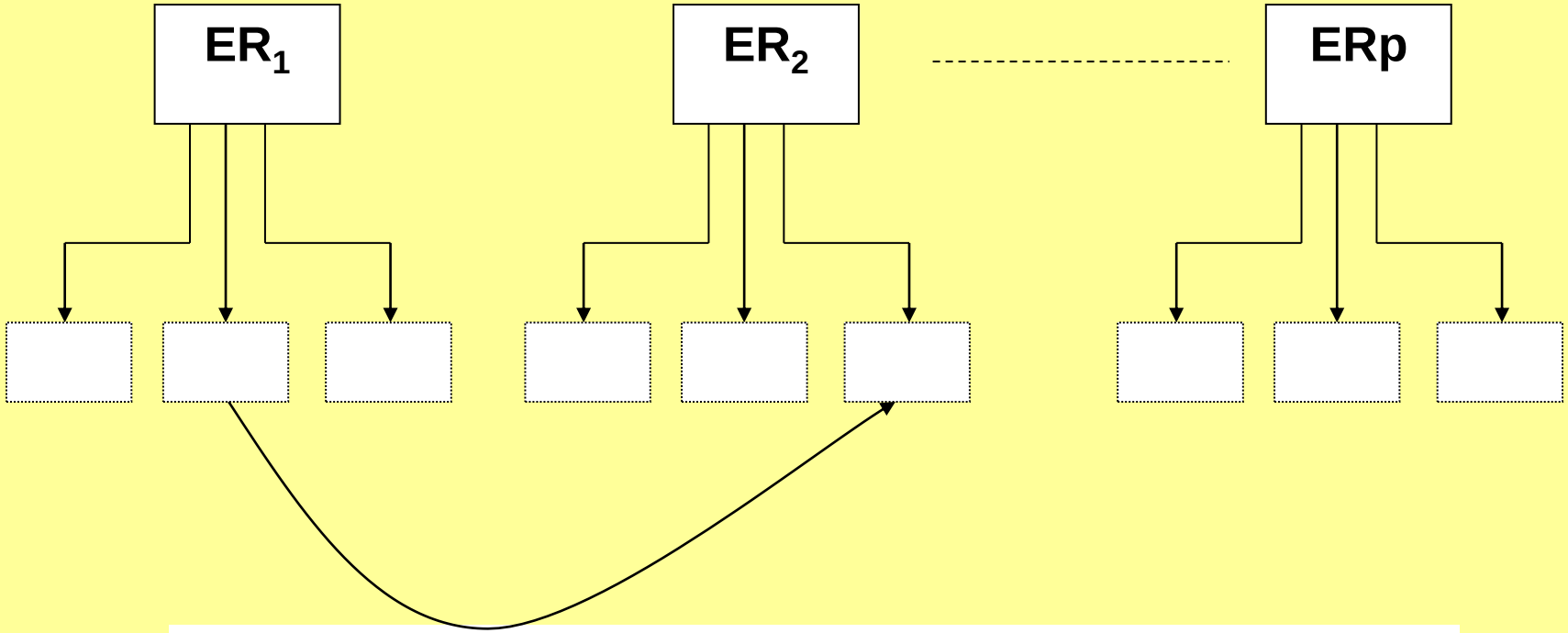
Approach 1



ER* Model Instantiation

An appropriate ER model is instantiated from ER* model and necessary modifications can be made on it depending on the revised scenario

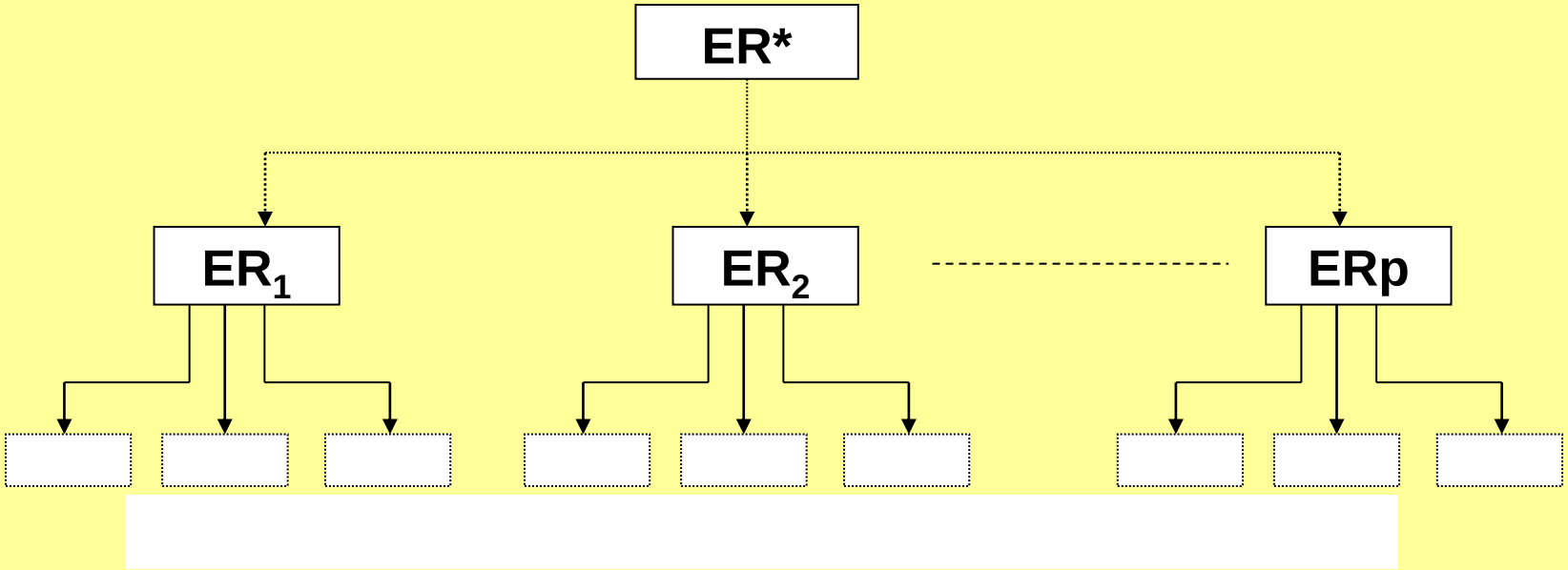
Approach 2



Template instantiation from multiple ER models

An application requires one or more additional template elements

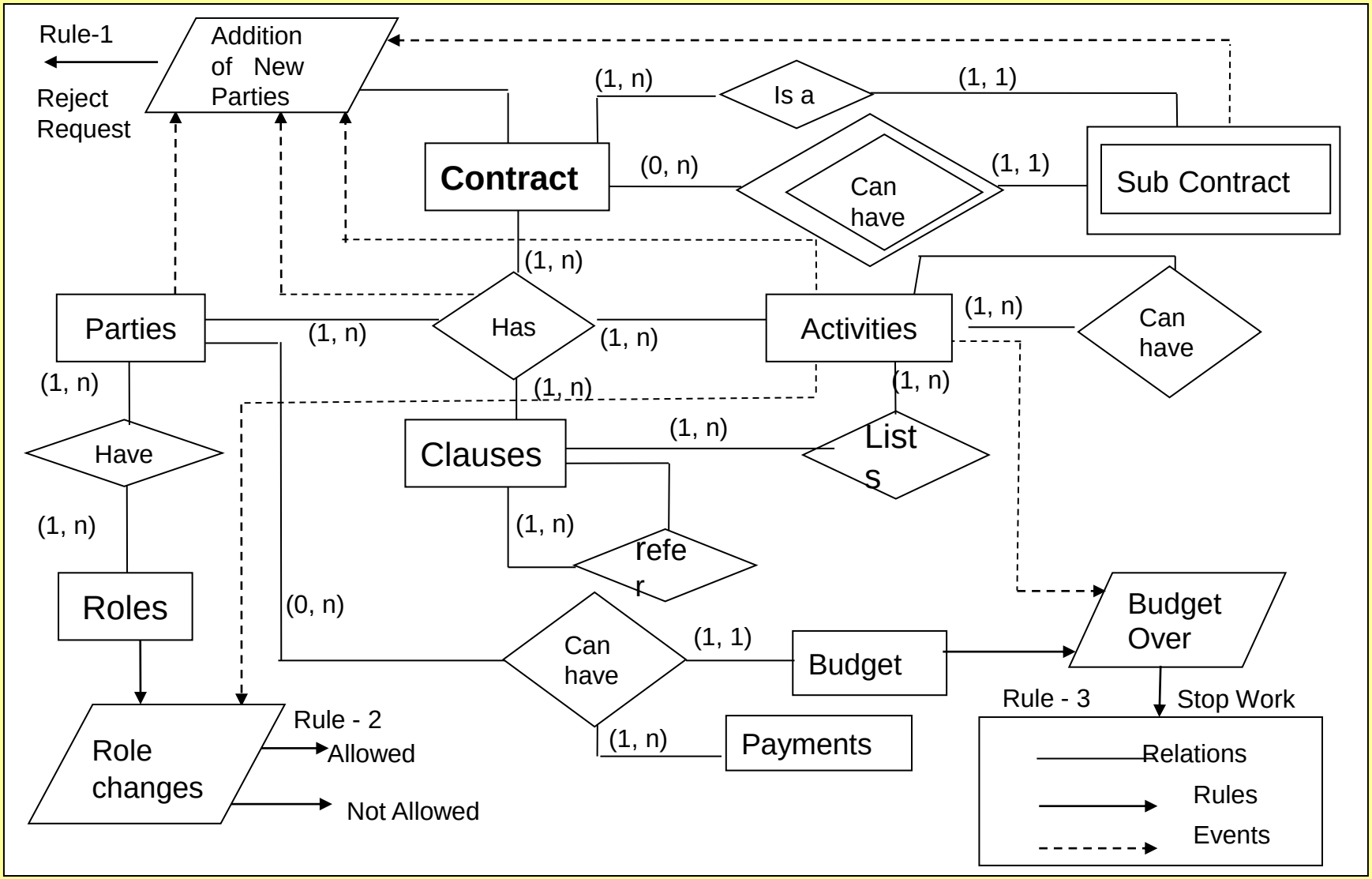
Approach 3



The change could evolve the template itself

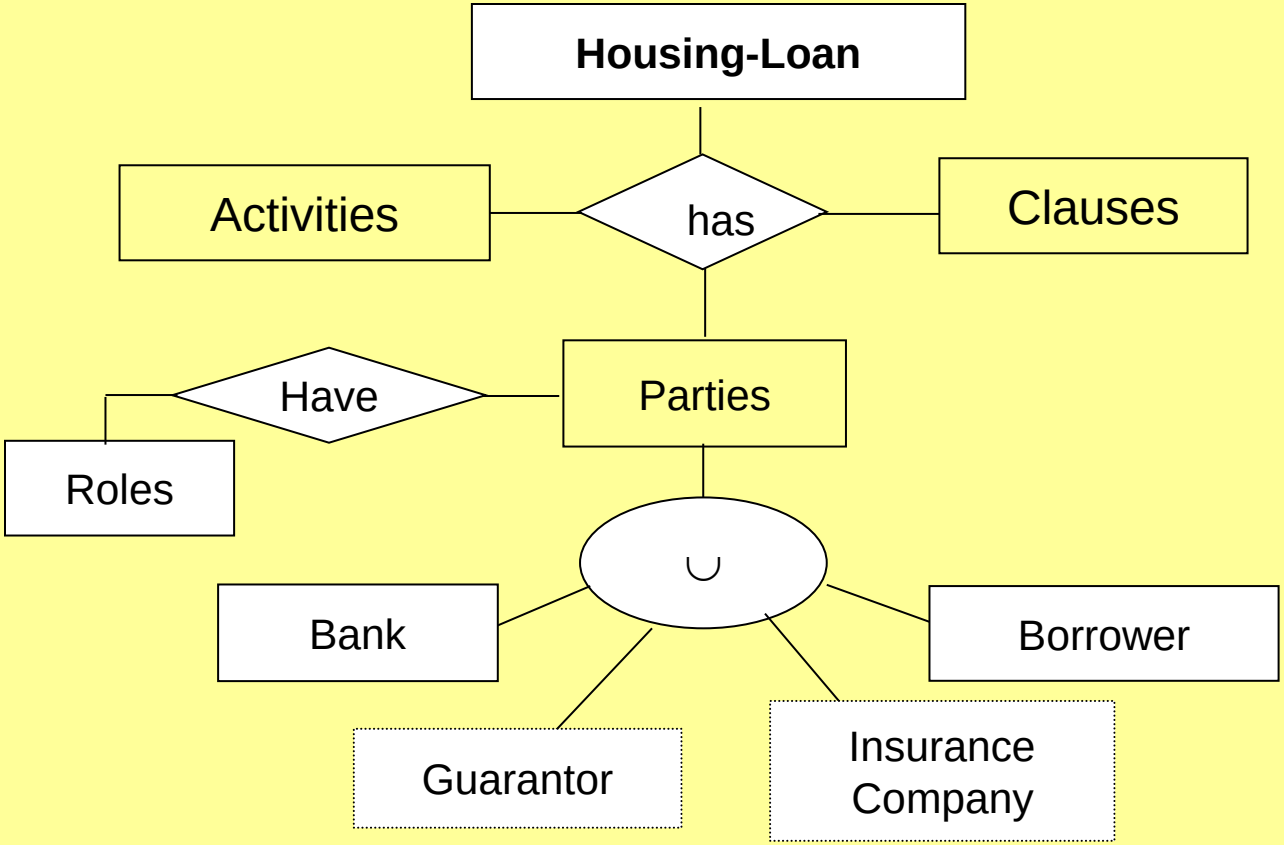
Example :
Housing-Loan contract

ER^{EC} Meta-Model

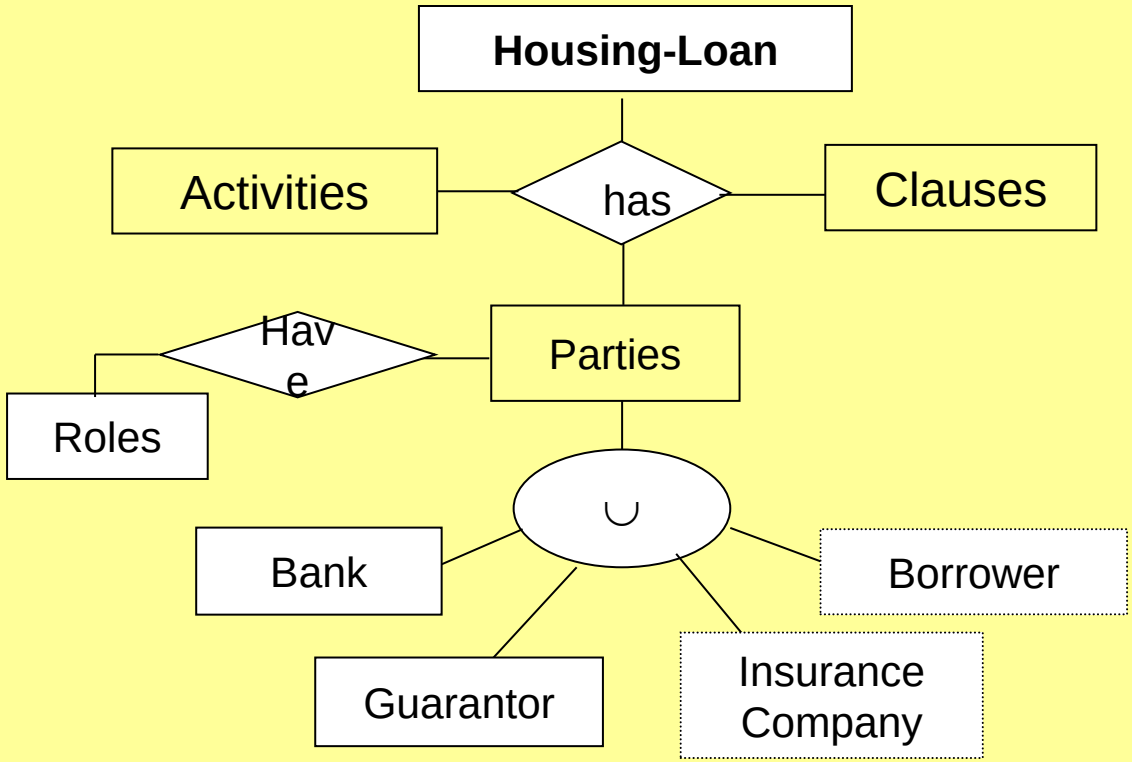


An ER^{EC} Meta Model for E-Contract

Standard template of Housing-Loan contract

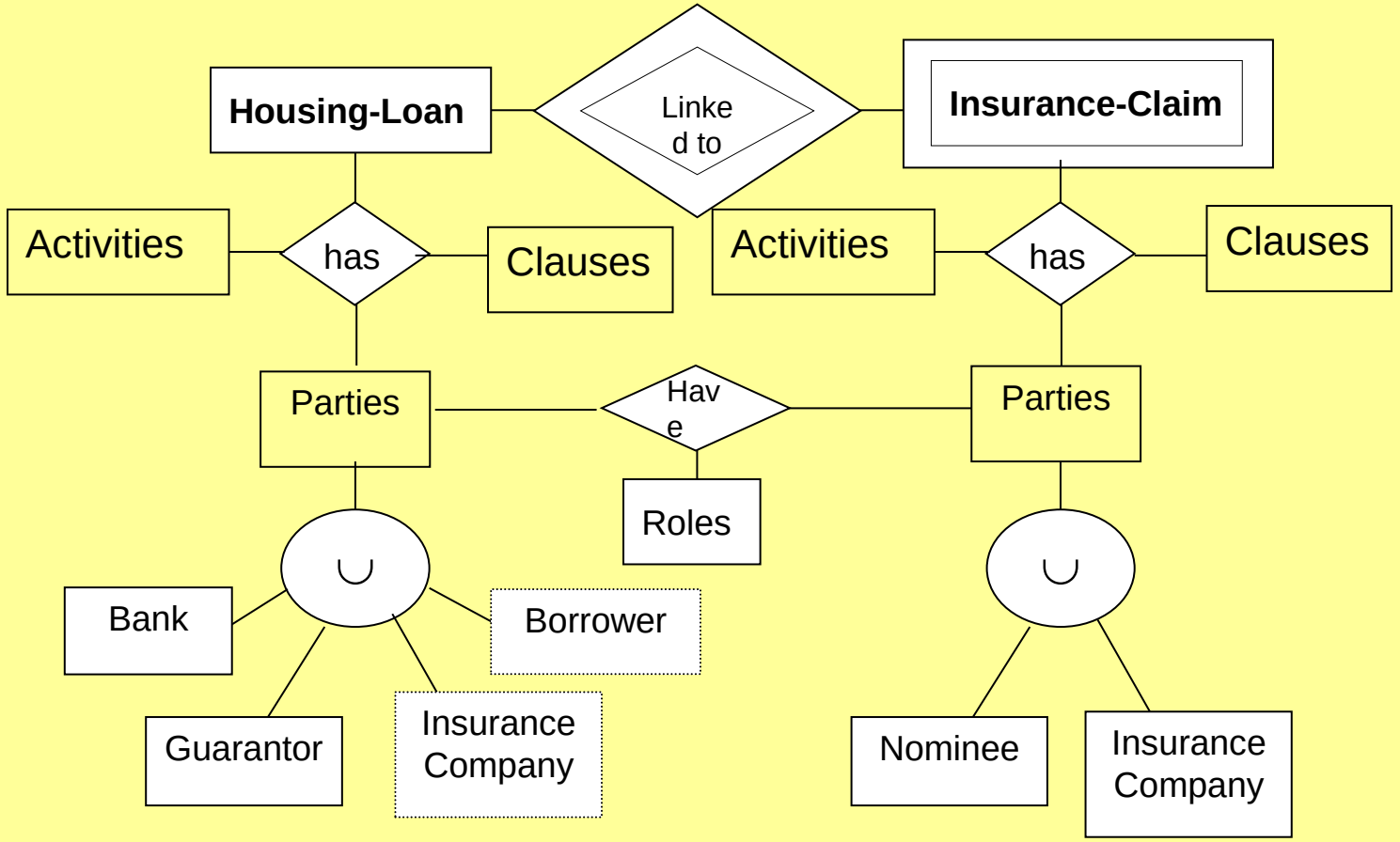


Case 1: (Run-time change) - Borrower defaults



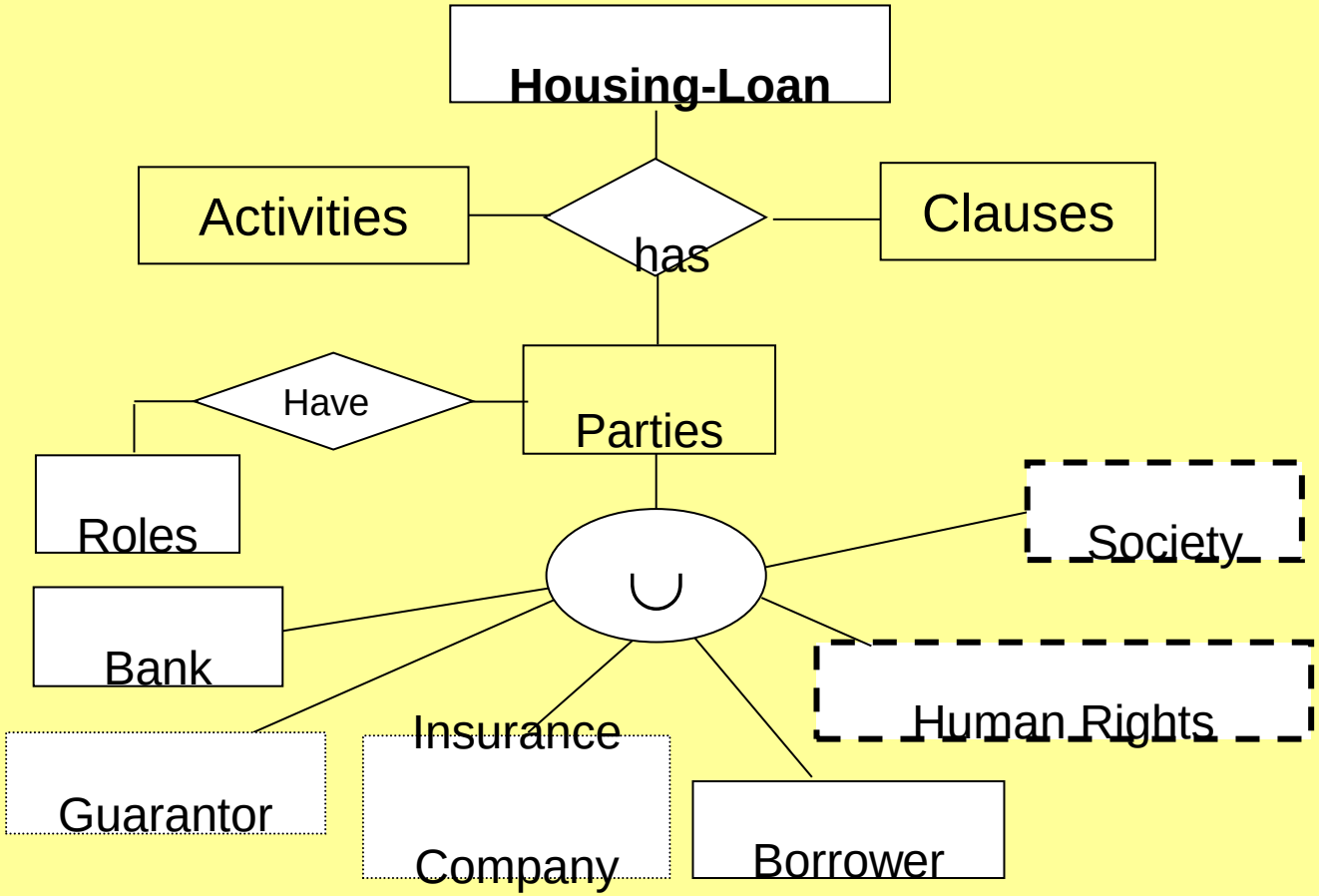
Template with change of roles

Case 2: (Run-time change) – Borrower's death/disablement

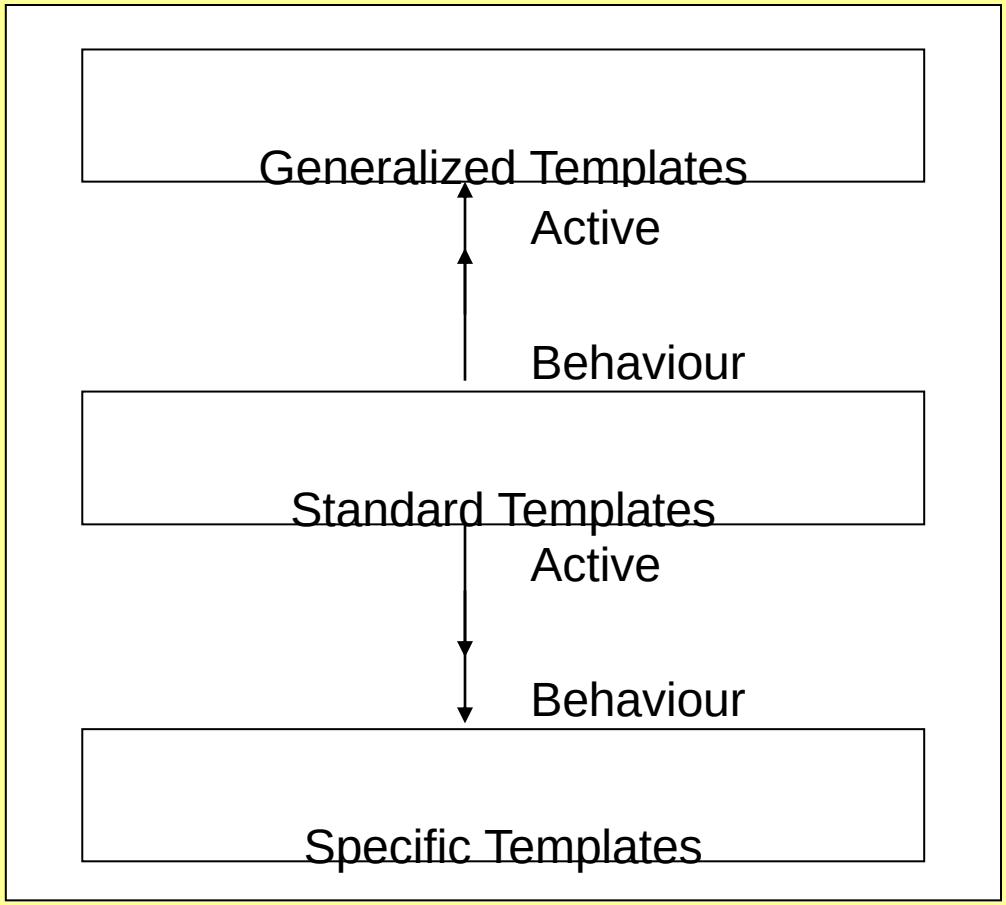


Template with addition of subcontract

Case 3: (Mini-world change) - road expansion



Template with additional concepts



Template Levels

Summary

- ER* meta-model and methodology can actively reflect the changes across various levels of data models in an application.
- The methodology is based on the past, present and future needs of an evolving application system.
- Described an instance of ER* methodology as a template selection procedure for evolving applications through an example.
- Our methodology helps in visualizing evolution procedure and develop specific procedures, methodologies and tools to actively support application evolution.