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Using RADs to move from Analysis to Design

Ali Fouad

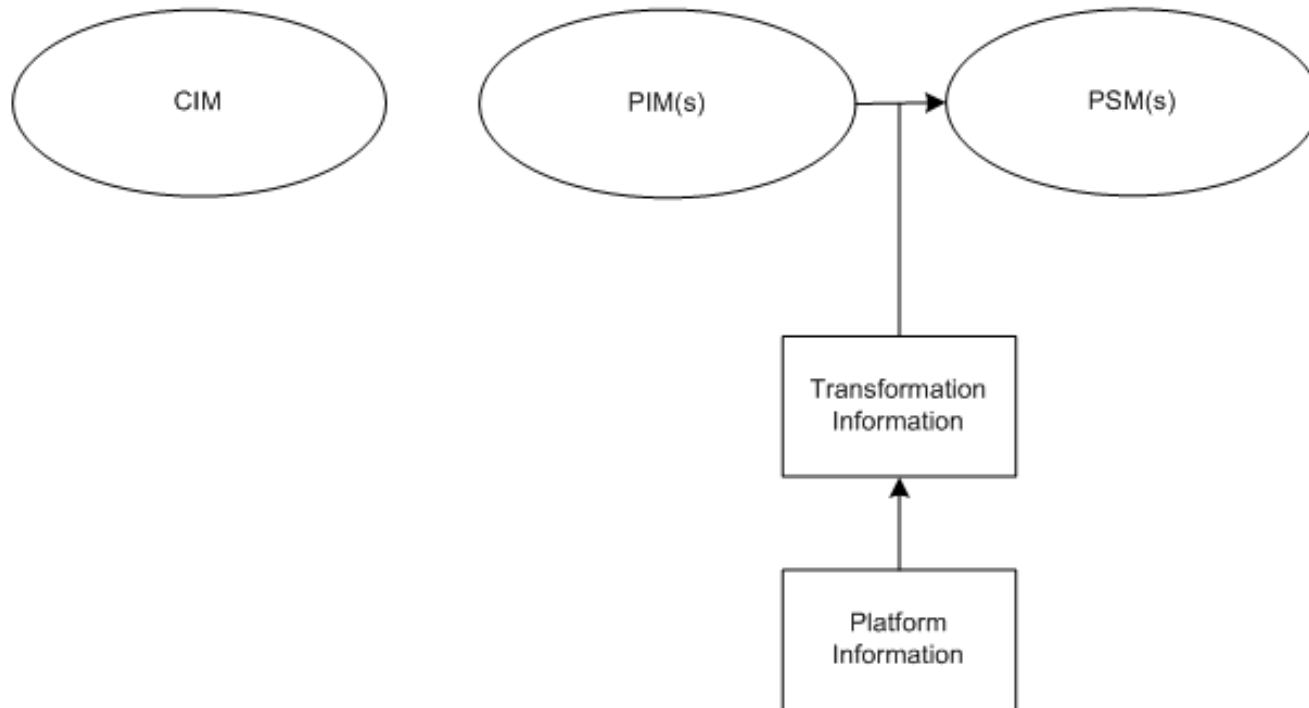
(Supervisor: K Phalp)

Software Systems Research Centre
Bournemouth University

- MDA
- RAD
- Environment RAD
- Shared RAD
- Machine RAD
- Transformation
- Discussion

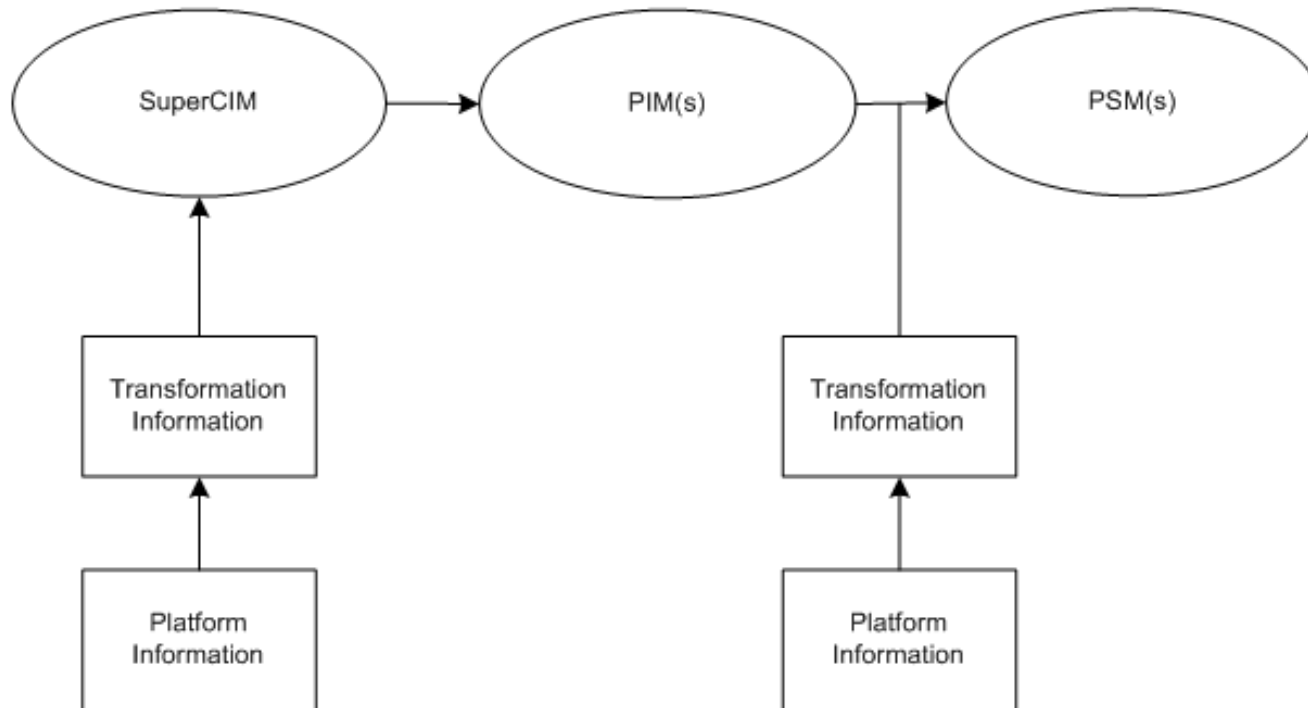
- OMG (2003) *MDA Guide* Version 1.0.1
- Computation Independent Model (CIM)
 - Problem domain and Requirements
- Platform Independent Model (PIM)
 - Class Diagram
 - Activity Diagram
- Platform Specific Model (PSM)
 - Code
- Notation : UML (support for BPMN)

MDA – Current State



MDA Viewpoints (Source: developed from (OMG 2003))

MDA – Proposal



Extended MDA (Source: developed from (OMG 2003))

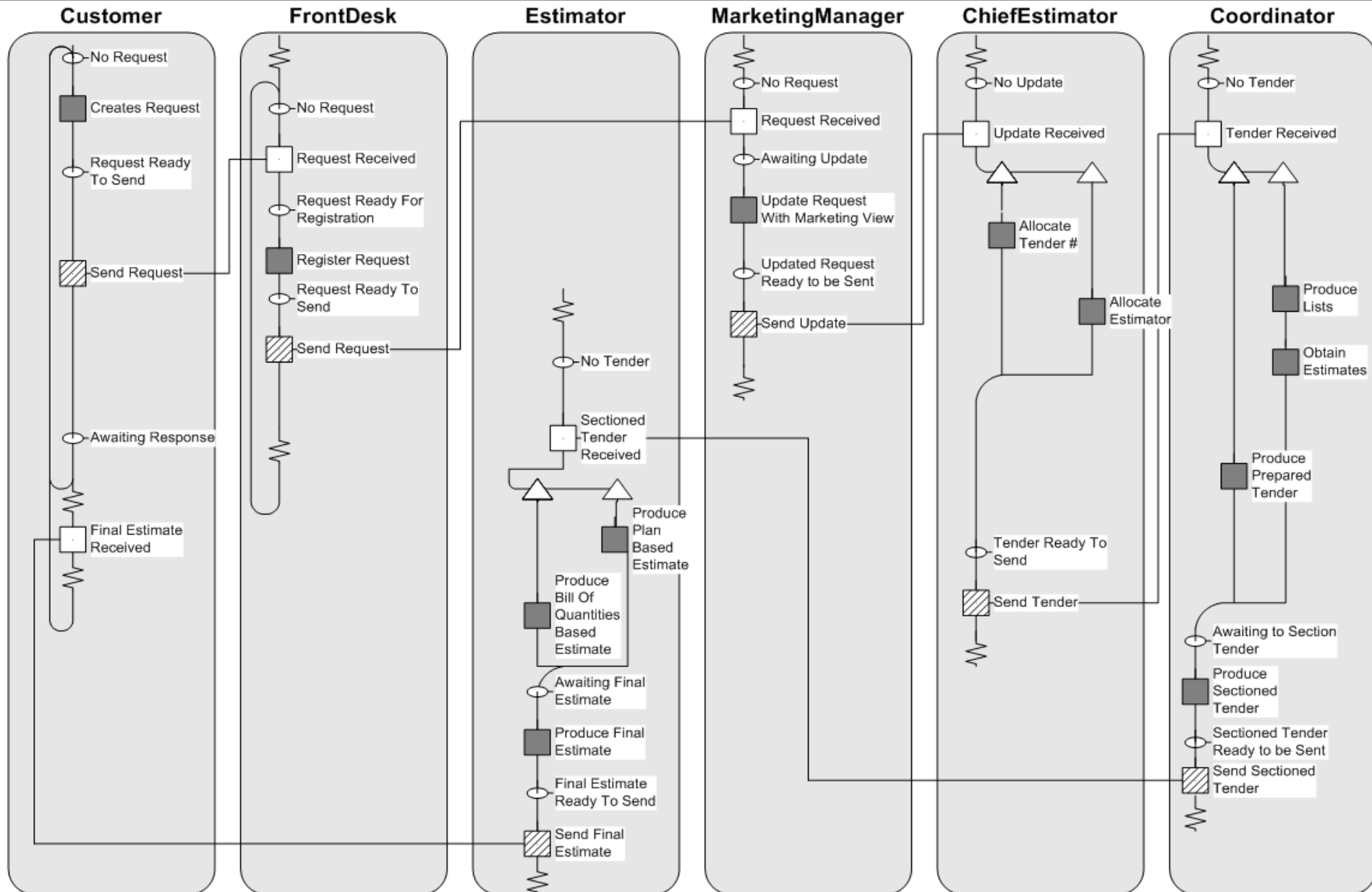
Role Activity Diagram (RAD)

- Martyn A. Ould - Business Process Management: A Rigorous Approach (2004) – In Library
- RAD is firmly grounded in Business Process Management (BPM) – Roles and Interactions
- RAD as a CIM
- Environment RAD (Analysis)
 - A process model?
- Shared RAD (Specification)
- Machine RAD (Design)

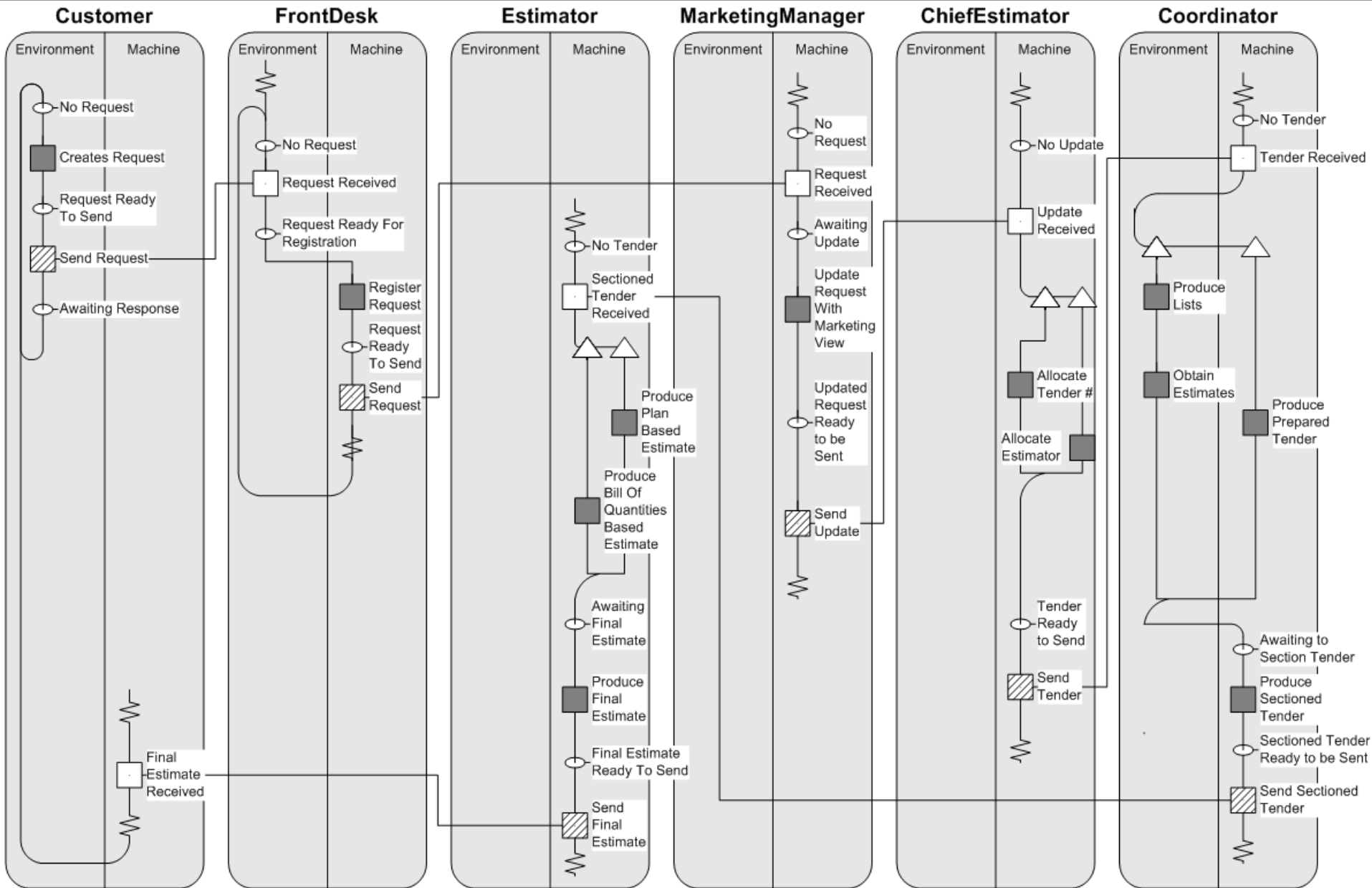
An Example - Tendering

- A request from a customer is sent via post to the front desk.
- They register the request and send it to the marketing manager. The marketing manager describes the marketing view and sends this (along with the request) to the chief estimator. The chief estimator allocates a tender number, and an estimator, and sends the tender to a co-ordinator.
- The co-ordinator has three main roles.
- They must do some preparatory work on the tender itself, producing a prepared tender.
- They must also produce lists of materials and sub-contracts that would be required in the tender. They must then use these lists to obtain estimates (from suppliers) for materials and sub-contracts.
- They must separate out those sections of the tender, which will need augmentation by the estimator.
- The co-ordinator will send estimates and the prepared tender to the estimator. The estimator produces a plan-based estimate and a 'bill-of quantities' based estimate. These views of the tender are produced separately, giving two different documented perspectives (with a cost based on the plan and a cost based on the quantities). The estimator then uses these to produce a final (combined) estimate and emails the final estimate to the customer.

Environment RAD



Shared RAD



Machine RAD

Customer

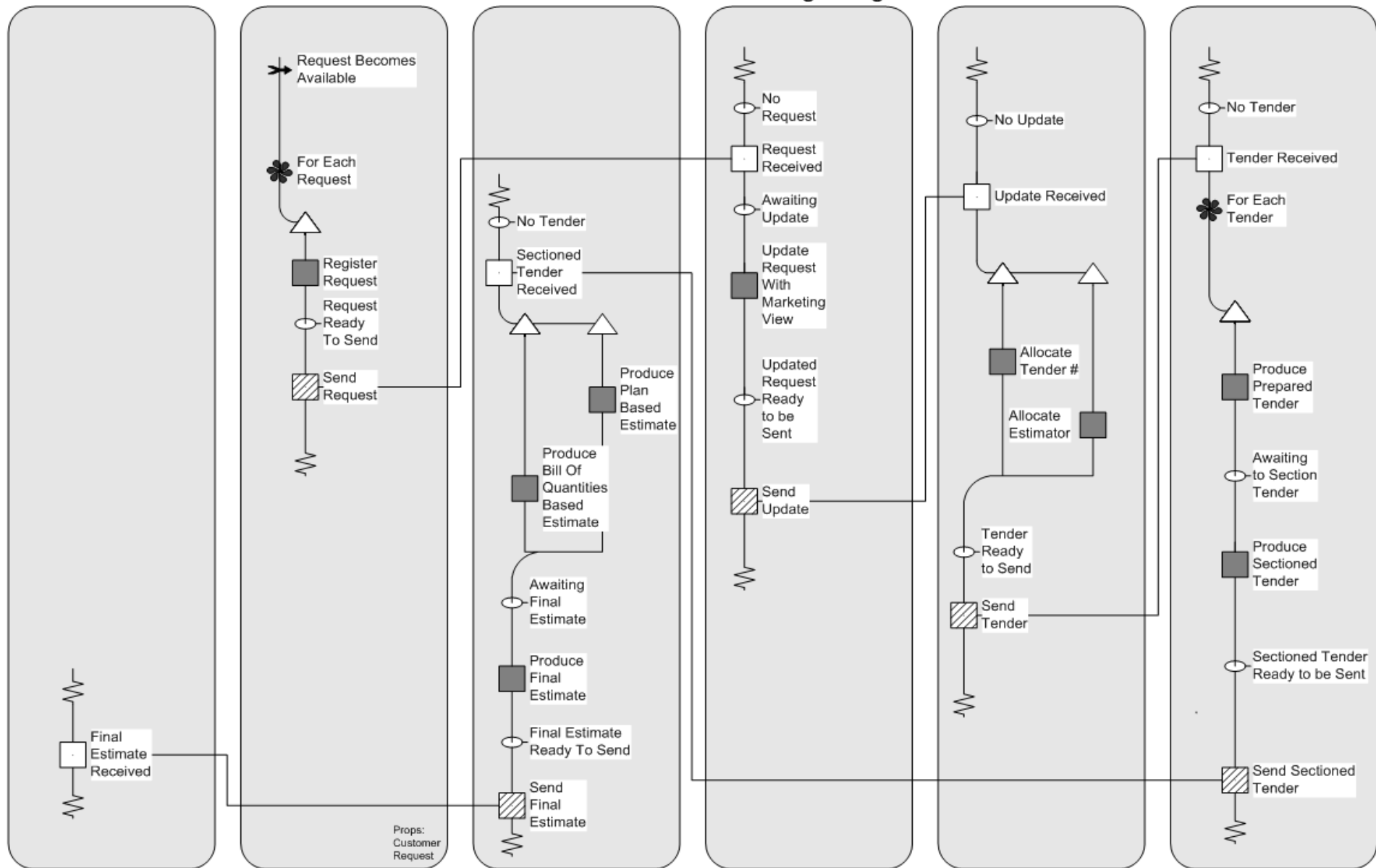
FrontDesk

Estimator

MarketingManager

ChiefEstimator

Coordinator



- RAD (Transformation) and UML (Platform) Meta-models
- from
 - RADs (Machine)
- to
 - Class Diagram
 - Activity Diagram
 - Use Case



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Transformation - Initial Rules (1)

NATURAL ENGLISH	RAD	UML Class Diagram	UML Activity Diagram	UML Use Case	Example
Noun referring to human or system	Role	Class	Activity Partition	Actor; Relationship to Use Cases derived from that Role	Project Manager
Transitive verb with direct object (noun)	Independent Activity	Operation; Class & Association if Object results from Activity	Activity	Use Case; Note: Chunk of activity may define a single Use Case	Writes report
Clause where sequence is defined (before or after)	Looping, Line and Descriptor States	Attribute (only applicable for descriptor states)	Transition	Check context; May define "extend" Relationship	Ready to write report; Writes Report; Ready to send report; Sends Report;
Clause joined with "or" Conjunction	Case Refinement (Alternatives)	Attribute	Decision Diamond; Guard	Relationship	Write report or Delegate Task
Clause joined with "and" conjunction	Part Refinement (Concurrency)	Attribute; Composition if refinement objects are descendent from resulting object	Synchronisation Bar	"Include" relationship	Writes and Sends Report; Write report a) and report b) to be contained within Assessment Report
Sentence containing Role subject and object nouns with transitive verb; optionally modified by adverb	Interactions	Association; Operation in Role Classes. Aggregation if Role interactions are exclusive to only a single Role	Activity; Transition	Source and Destination Use Case; Relationship. Note: Chunk of activity may define a single Use Case	Project Manager sends Report to General Manager and Contractor Quickly



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Transformation - Initial Rules (2)

Transitive verb with Role noun initiating new Role noun	Start Role	Role Class; Operation in Source Role Class; and Association	Activity Partition; Activity and transition	Actor	Project Manager selects Contractor
Noun referring to an event that starts a process	Trigger	Attribute	Start; Guard	Notes	Complaint is received
Quantifier associated with activity	Replication	Count attribute	Decision Diamond; Guard; Transition (loop) encapsulating replicated activity	Notes	For every application received, assess it
Where sequence is undefined before or after)	Undefined	Check context; May define alternate CD; Association	Check context; May define alternate AD; Transition; Stop	Check context; May define alternate UC; Relationship	The project manager writes report; The Project Manager owns a car
Determiner associated with Role noun	✓	Multiplicity	Notes	Multiplicity	There are 500 employees; The Project Manager
Transitive verb and noun consumed by Role noun	Props	Class	Notes	Check context; May define alternate Actor; Use Case; Notes	Uses database
Sequence terminating Transitive verb	Stop	Attribute in originating Role Class	Stop	Notes	Project Ends
Adjective modifying noun or Pronoun	Notes	Attribute	Notes	Notes	Project Manager is logged in

Machine RAD

Customer

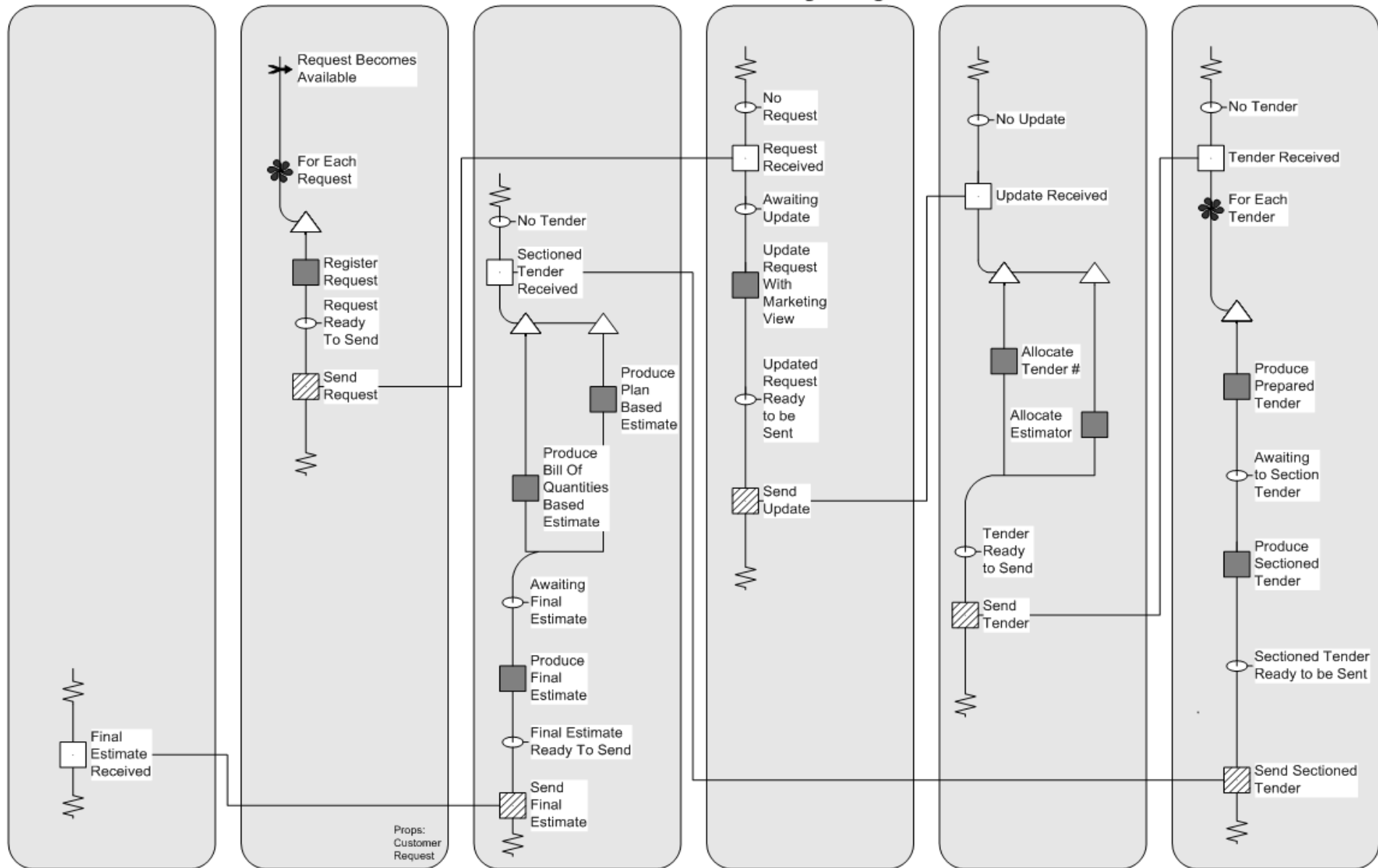
FrontDesk

Estimator

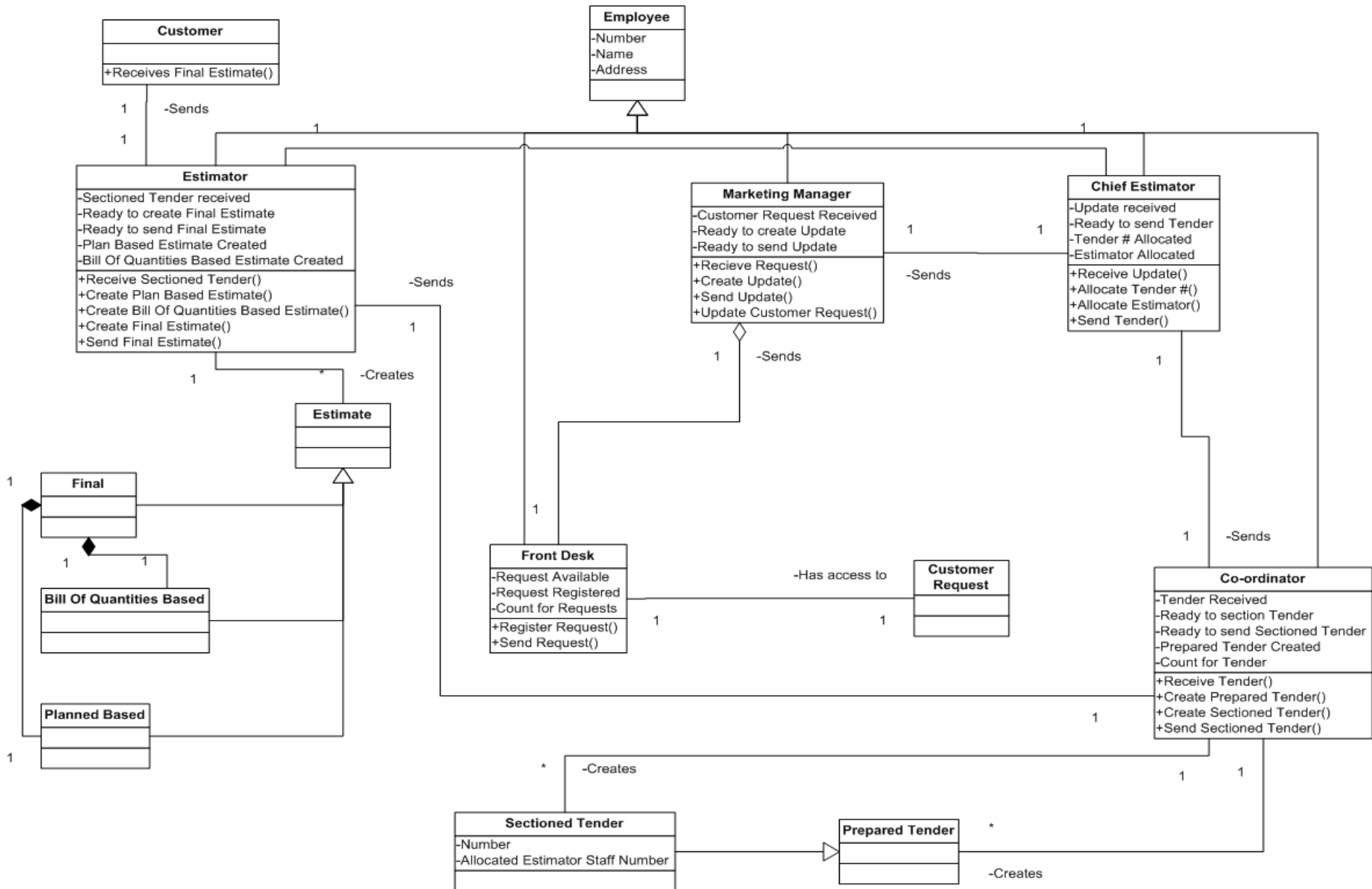
MarketingManager

ChiefEstimator

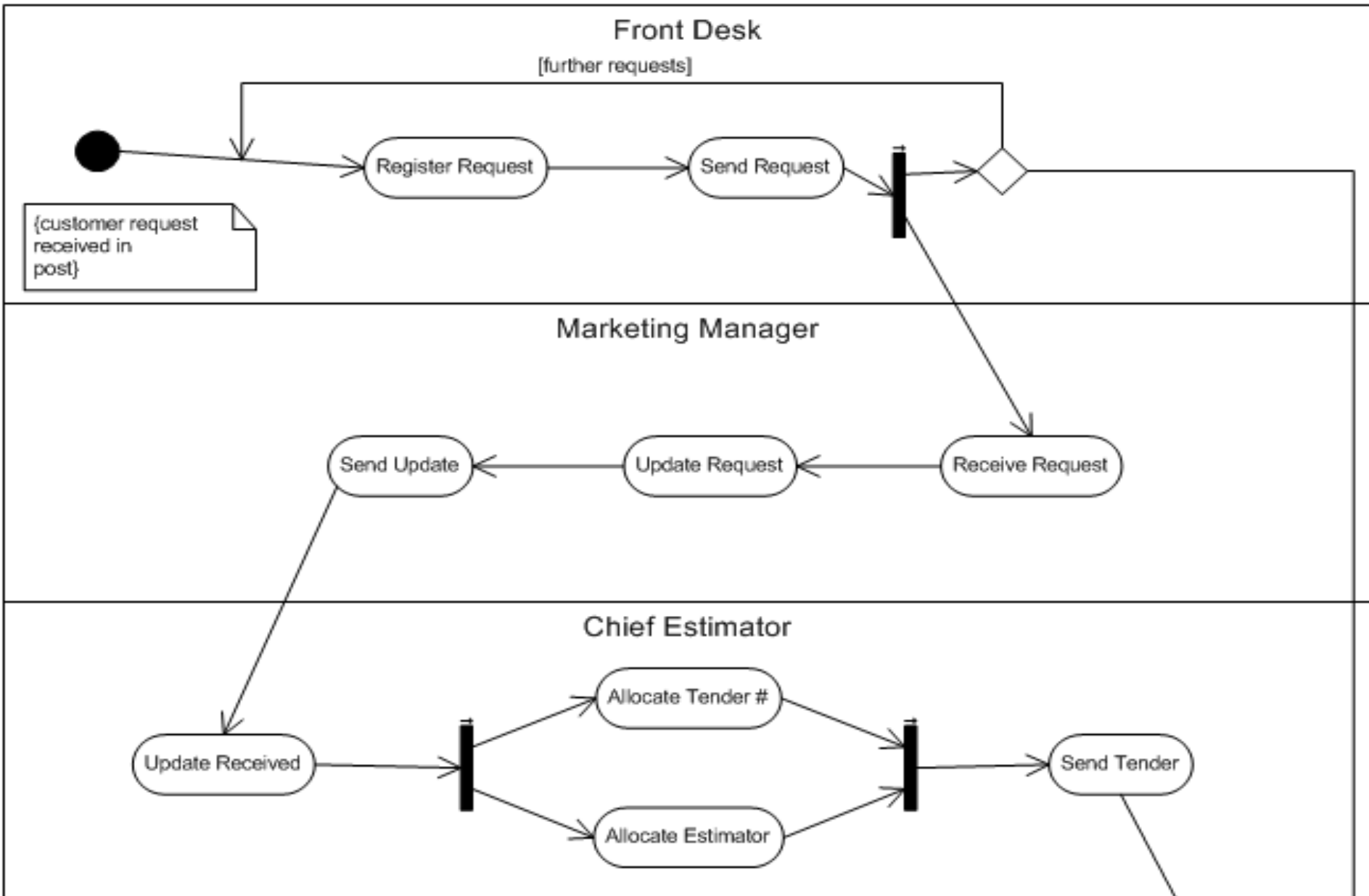
Coordinator



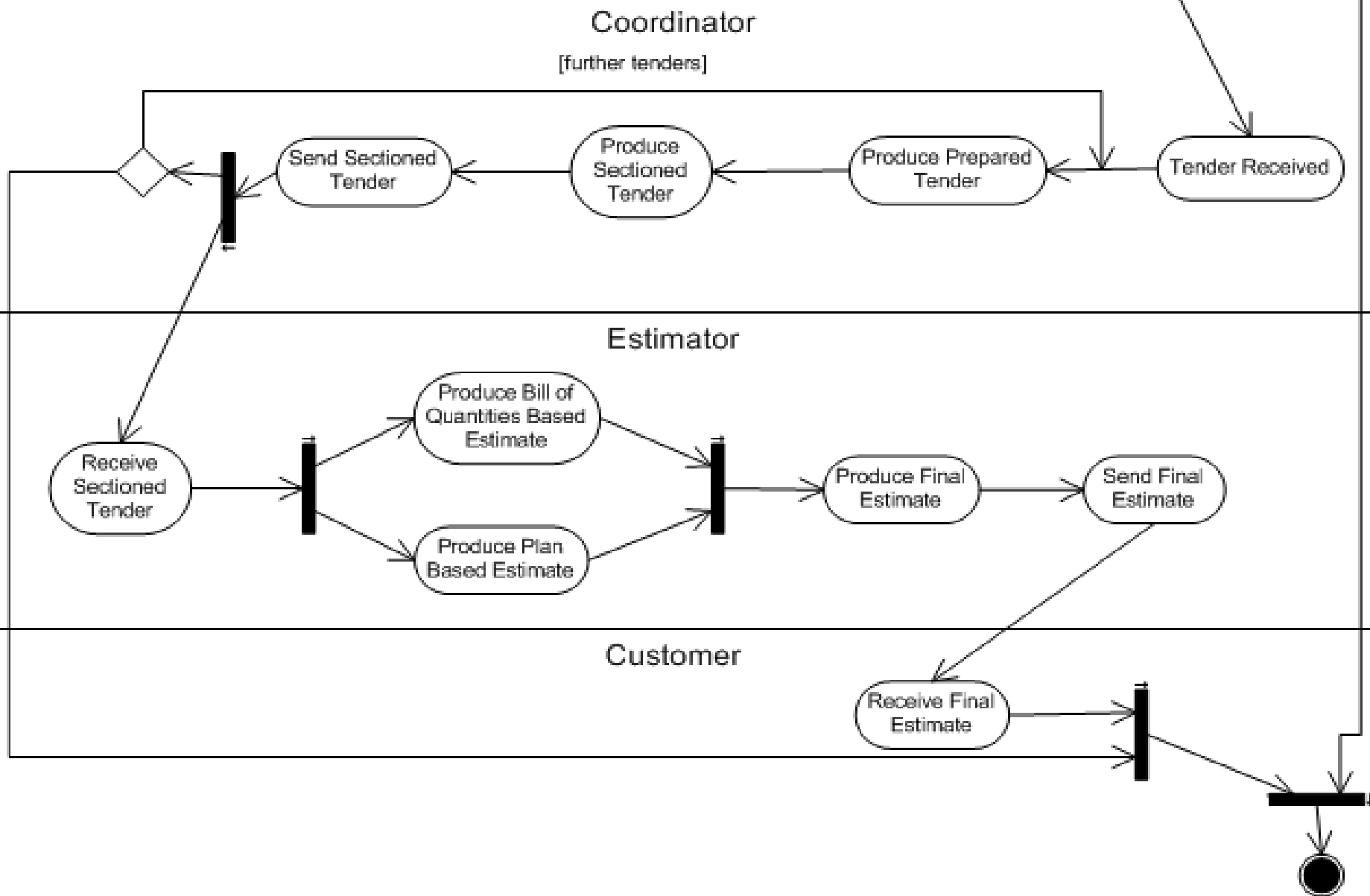
Transformation – Class Diagram



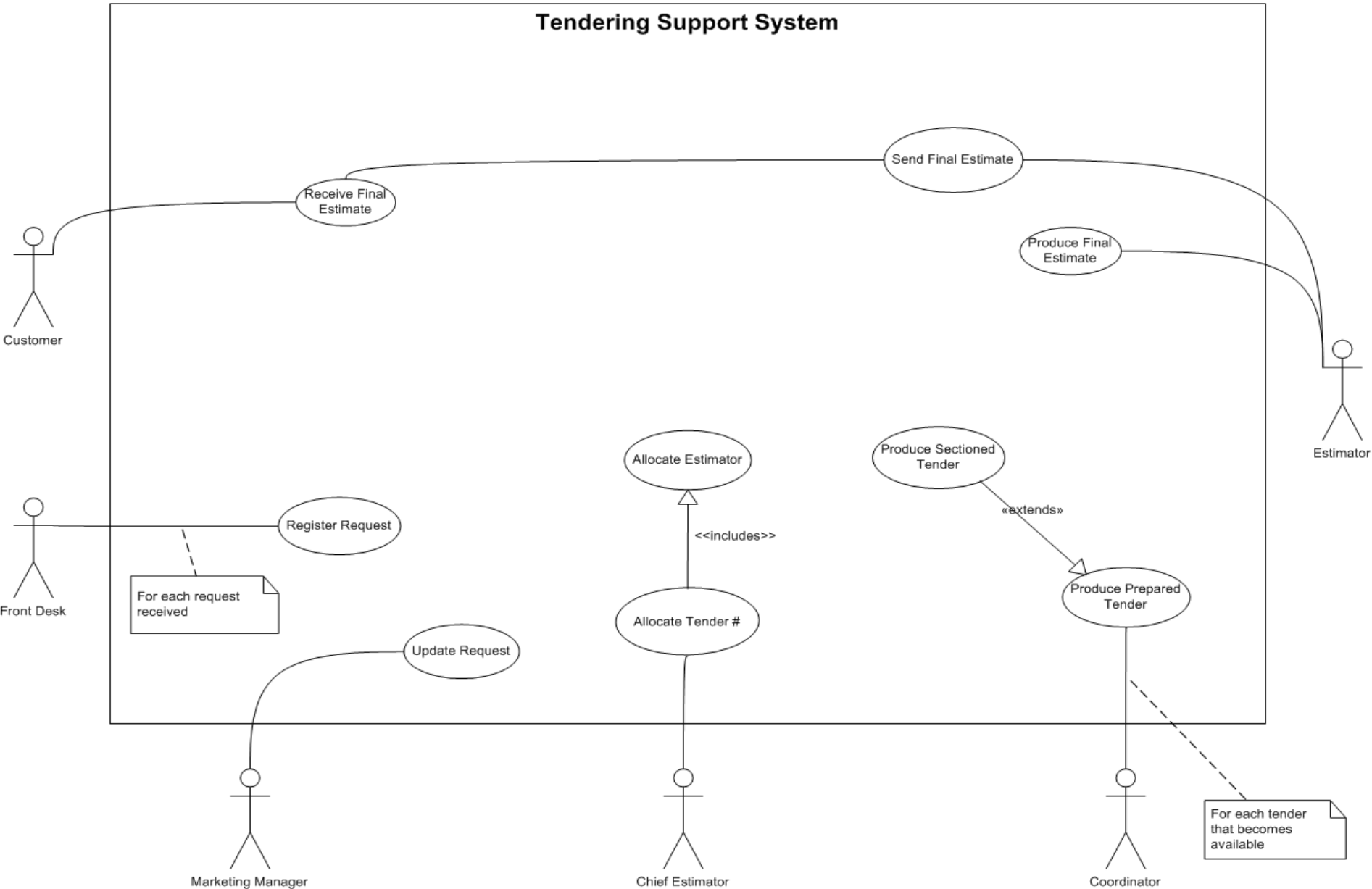
Transformation – Activity Diagram (1)



Transformation – Activity Diagram (2)



Transformation – Use Case Diagram



- Not an automatic process (semi-automatic with tool support) – Do we want it to be?
- Enterprise Systems – Can this really work?
- Systems Development – Do we want systems to be designed along natural business roles?

- Try it!

- MDA: OMG (2003) *MDA Guide Version 1.0.1*
 - www.omg.org/mda/
- RAD: Martyn A. Ould (2004) *Business Process Management: A Rigorous Approach*
 - <http://www.veniceconsulting.co.uk/>

Software Systems Research Centre
Bournemouth University, Poole, Dorset, BH12 5BB.
AFouad@bournemouth.ac.uk