

# Software Industrialization and The New IT

A Perspective on MDA®

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**Portions adapted from the book**

**Model Driven Architecture: Applying MDA to Enterprise Computing**

**David S. Frankel**

# Agenda

- Commoditization: Where Carr is Right
- The Demands of the Virtual Enterprise
- MDA: Industrializing Software
- The New IT—What Carr is Missing

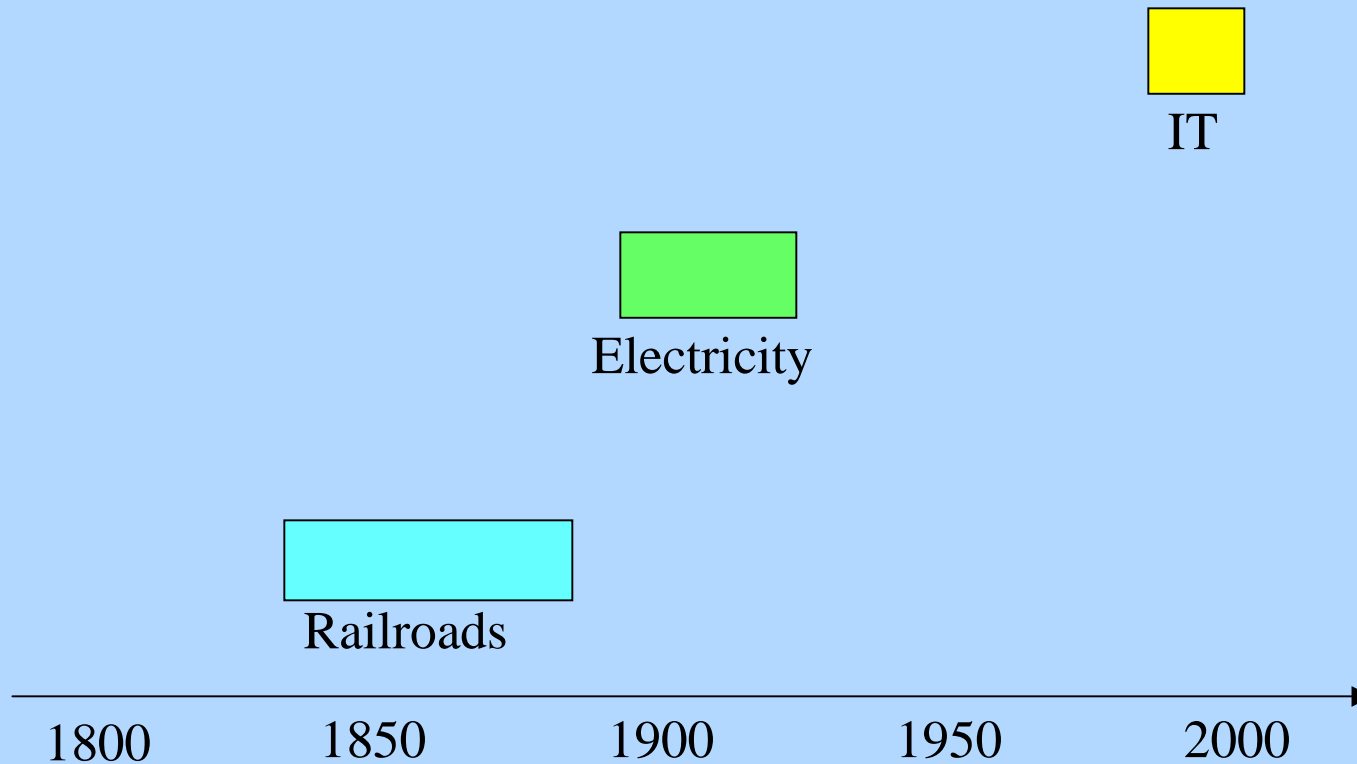
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# The Carr Thesis

## Build-Out Periods Followed by Commoditization



Once commoditization occurs:

- Focus changes to using the technology efficiently
- The technology does not confer strategic advantage

# Evidence of Commoditization

- Ubiquitous infrastructure technology
  - Internet, servers, PCs, application servers
- Low-level programming labor is being commoditized
  - Automating some of the labor via code generation
    - Even “traditional” IDEs have many wizards for code generation
  - Moving some labor offshore
    - Cultural factors restrict this more in some countries
  - Labor commoditization is following the path of industrial manufacturing industries

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# Increased Complexity Facing IT

Uniform  
User  
Devices

Fat  
Clients

Web  
Clients

Wireless  
Handhelds

Telephone  
Keypads

Support Business  
Functions  
Within the Enterprise

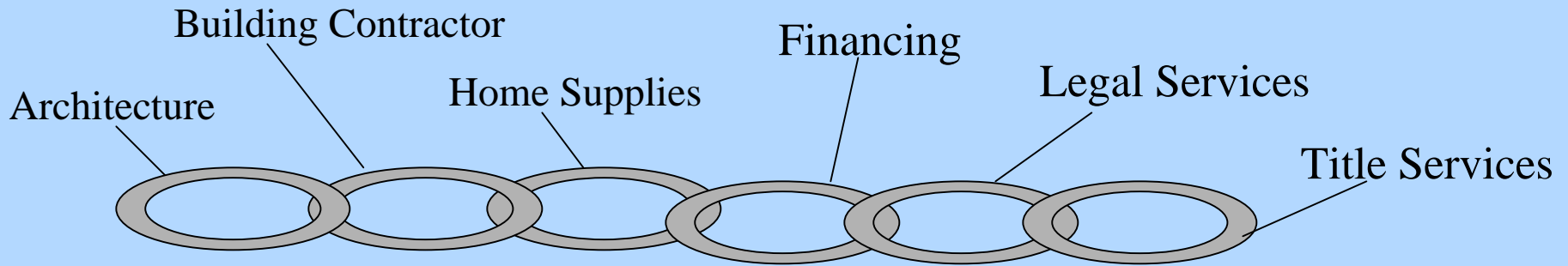
Support Business  
Functions  
Within the Enterprise, C2B, and B2B

Complexity



# Value Chain Driven Business

## Rapid Assembly of Value Chains



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# MDA and Commoditization

- Accelerates the trend toward automating low-level programming
- New business model for some U.S. solution providers
  - Architects and designers work with customer, build models, generate code
  - Offshore programmers do finishing work
  - Strong process supports coordination

# Principles of Industrial Manufacturing to Achieve Efficiencies and Automation

- Formal blueprints
- Components
- Patterns

# Bringing Model-Centrism to Intermediate Tiers, EAI and B2Bi

- Part of general trend to raise the abstraction level
- Models as development artifacts
  - Not simply blueprints for humans
- Already well-established for front and back ends
  - WYSIWYG GUI modeling and data modeling
  - Hand coding no longer predominates
  - But tuning allowed

# Component-Based Development

- Interchangeable components and scientific management were the keys to the industrial revolution
- More than objects: Independently deployable
  - Requires a container to plug into
- Excellent source: *Business Component Factory*, by Peter Herzum and Oliver Sims

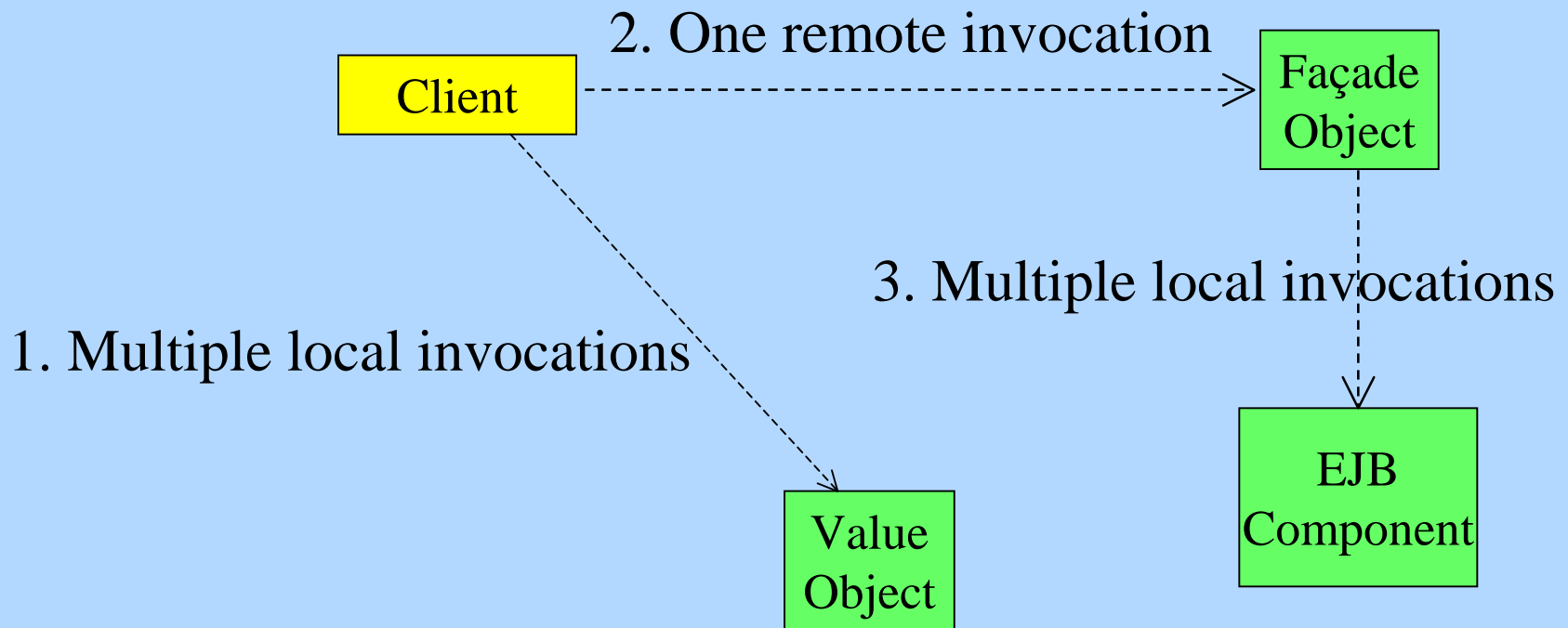
# Design Patterns

- Patterns at the technical level
  - Such as *Java Blueprints*
  - Best practices for implementing components or a set of interacting components
- Some patterns make sense at the level of business semantics
  - Such as the *Observer* pattern (Gamma et al)

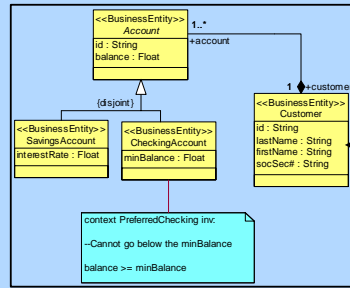
# Automatic Pattern Replication

- MDA generators encapsulate pattern knowledge
  - And apply patterns automatically
  - Technical patterns are the most amenable
  - Repetitive hand-coding of each pattern instance is inefficient
  - Patterns community is coming around to this view
    - e.g. John Crupi
- Generators can enforce large scale patterns or *architectural styles*
  - Richard Hubert, *Convergent Architecture*

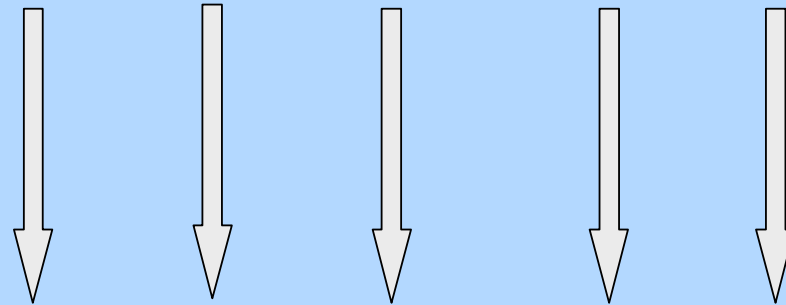
# Using Value Object Design Pattern to Set Attributes



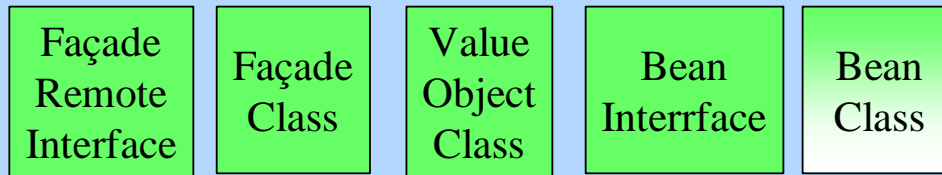
# A Generator Applying the Value Object Pattern



Model of Customer Entity



Generator



 = completely generated

 = partially generated

# Generative Programming (GP) Synthesizes Several Approaches

- Aspect-Oriented Programming
- Domain Engineering / Product Line Practices
- Intentional Programming

Key book for GP—*Generative Programming*, Krzysztof Czarnecki and Ulrich W. Eisenecker

Key book for MDA-GP relationship--*Software Factories: Assembling Applications with Patterns, Models, Frameworks and Tools*, Jack Greenfield et al (Q4 '03)

# Model-Driven Development vs. Model Driven Architecture

- MDA includes model-driven development
- Also about model-driven deployment
  - Currently deployment tools metadata is fragmented
    - Little standardization
- Also about model-driven management (ops)
  - Generating instrumentation from models of service-level agreements (SLAs)
  - Java Management Specification (JSR-77) provides some standardization

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# Where This is All Headed

- Carr's analogy breaks down
- Software is malleable—as Carr points out
- Whole new technologies can emerge from the digital realm
- One is computer-assisted business process management (CA-BPM)

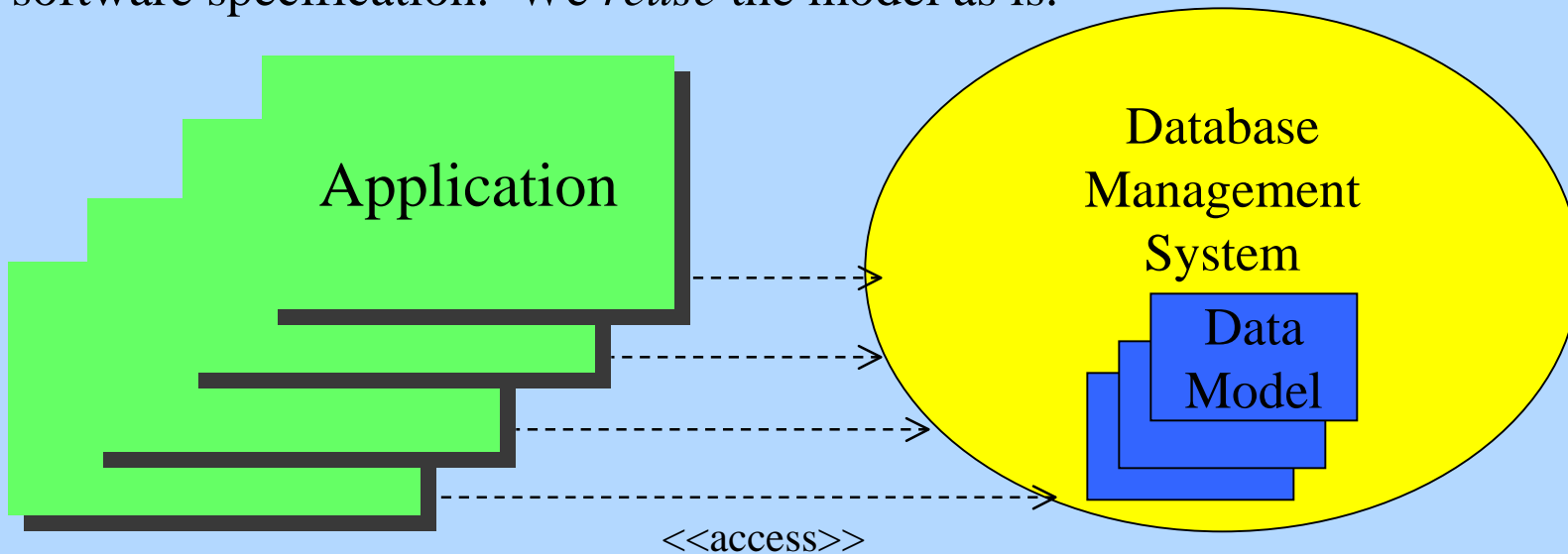
# CA-BPM

- CA-BPM uses software tools to manage business processes directly
- Closes the abstraction gap between business processes and IT systems
- The Old IT vs. the New IT
  - The Old IT is driven by software design
  - The New IT is driven by business process design

# DBMS



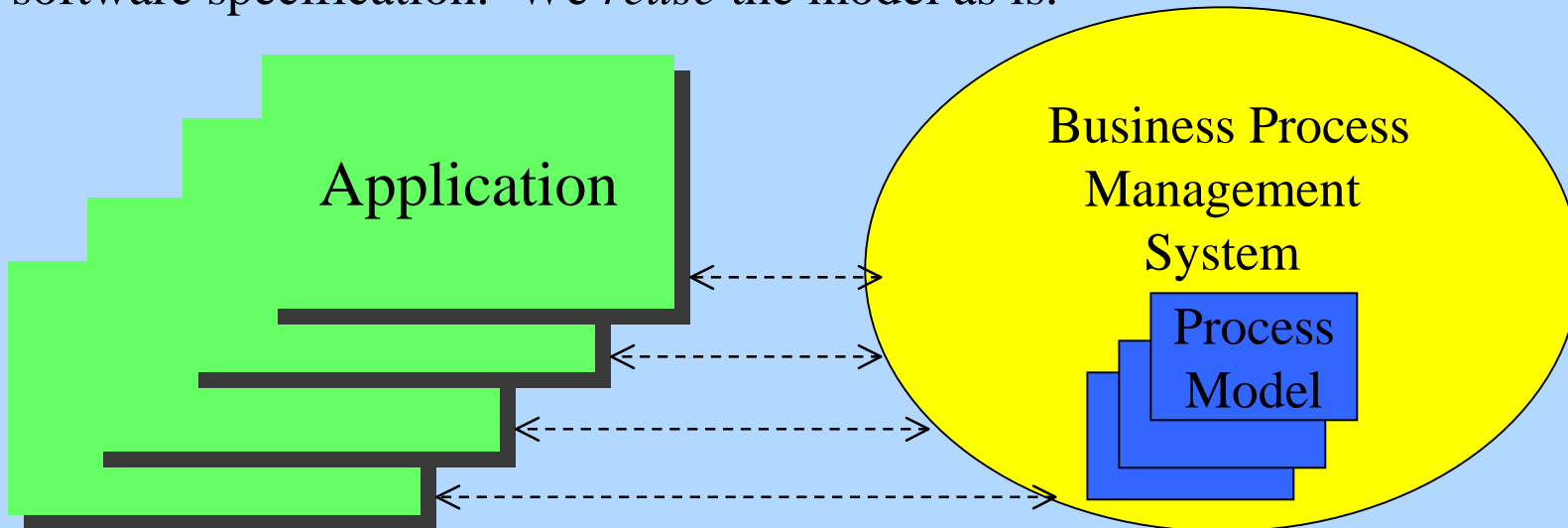
With a DBMS we don't refine the business model to a software specification. We *reuse* the model as is.



# BPMS



With a BPMS we don't refine the process model to a software specification. We *reuse* the model as is.



# DBMS and BPMS

- Functions of a DBMS
  - Support data modeling
  - Integrity checking
  - Multi-user access mediation
  - Transaction management
- Functions of a BPMS
  - Analogous functions, plus...
  - Simulation and tuning
  - Process enactment
  - Facilities for combining processes into value chains

# CA-BPM Origins

- First wave: First breakthroughs in scientific management
- Second wave: Business Process Re-engineering (BPE)
  - Post-mortem by BPE practitioners
    - Too quick to discard existing resources
    - Radically redesigned business processes were no more flexible than their predecessors
    - Largely done manually
- Third wave: CA-BPM
  - Driven by value chain business strategies

Book--Business Process Management: The Third Wave, Howard Smith and Peteringar

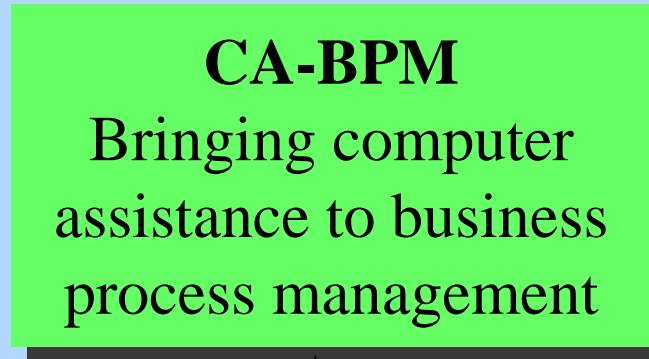
# The “M” in CA-BPM

- *Managing* business processes is the motivation
- Computer assistance is for this purpose
- *Not* the same as describing some process flows to do EAI
  - Includes this but not motivated by it
- CA-BPM comes from the business process world, not the IT world
  - It needs IT, but will drive IT
  - As CAD models drive production machinery

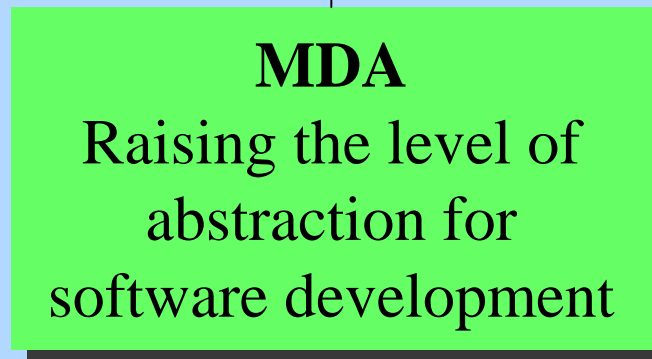
# CA-BPM and MDA Converge

## At the Intersection of the Business and IT

Business



IT



# Qualitative Change

- The point of convergence yields a qualitative change
  - As important as electricity, railroads, and the Old IT
  - Companies derive competitive advantage from their business processes and value chains
- MDA on its own, below the point of convergence, is an effort to rationalize production in the Old IT model
  - MDA is necessary
  - But must be seen in proper perspective
  - Commoditization of Old IT is real
- Much of the Old IT technology will remain in place
  - But as it morphs into the New IT, it will be driven by business process design

# Caveats

- Business process VM should not execute all fine grained computations
- Still have to generate software for parts of the process that need to be automated
  - And that are not served by legacy systems
  - Such software will interact with the BPMS
- CA-BPM systems come with connectors and adaptors
  - Specialized ones for local IT systems will have to be generated
- Like MDA, transition must be gradual
- BPEL and BPML are probably too low-level for business process design
  - Pi calculus is not an abstraction for business people
  - OMG Business Process Definition metamodel should be at business abstraction level

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