



Model-Driven Business Process Platforms

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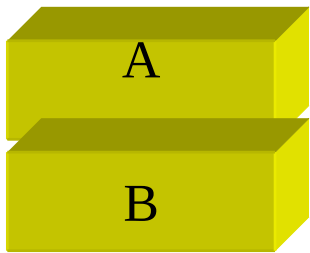
Last-generation value proposition

- **Applications embody well-validated, accepted business processes**

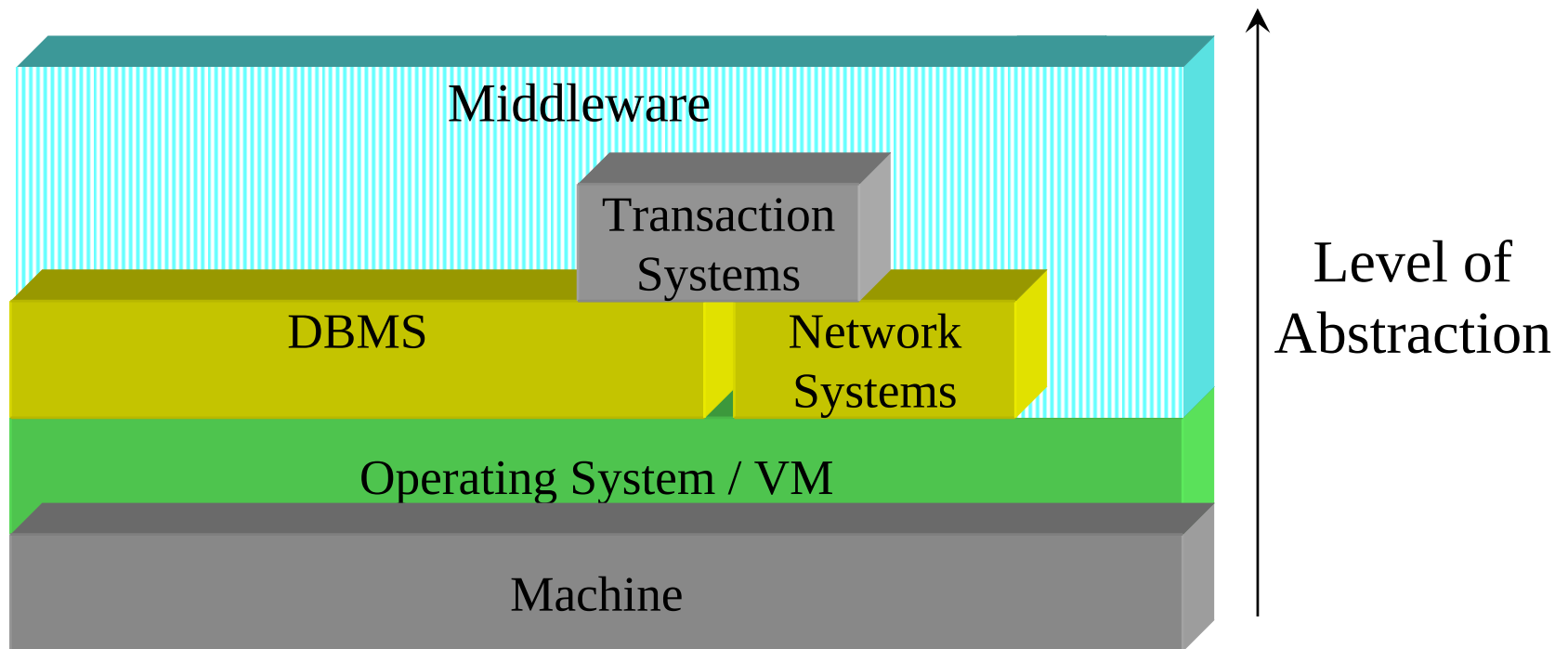
Next-generation business reality

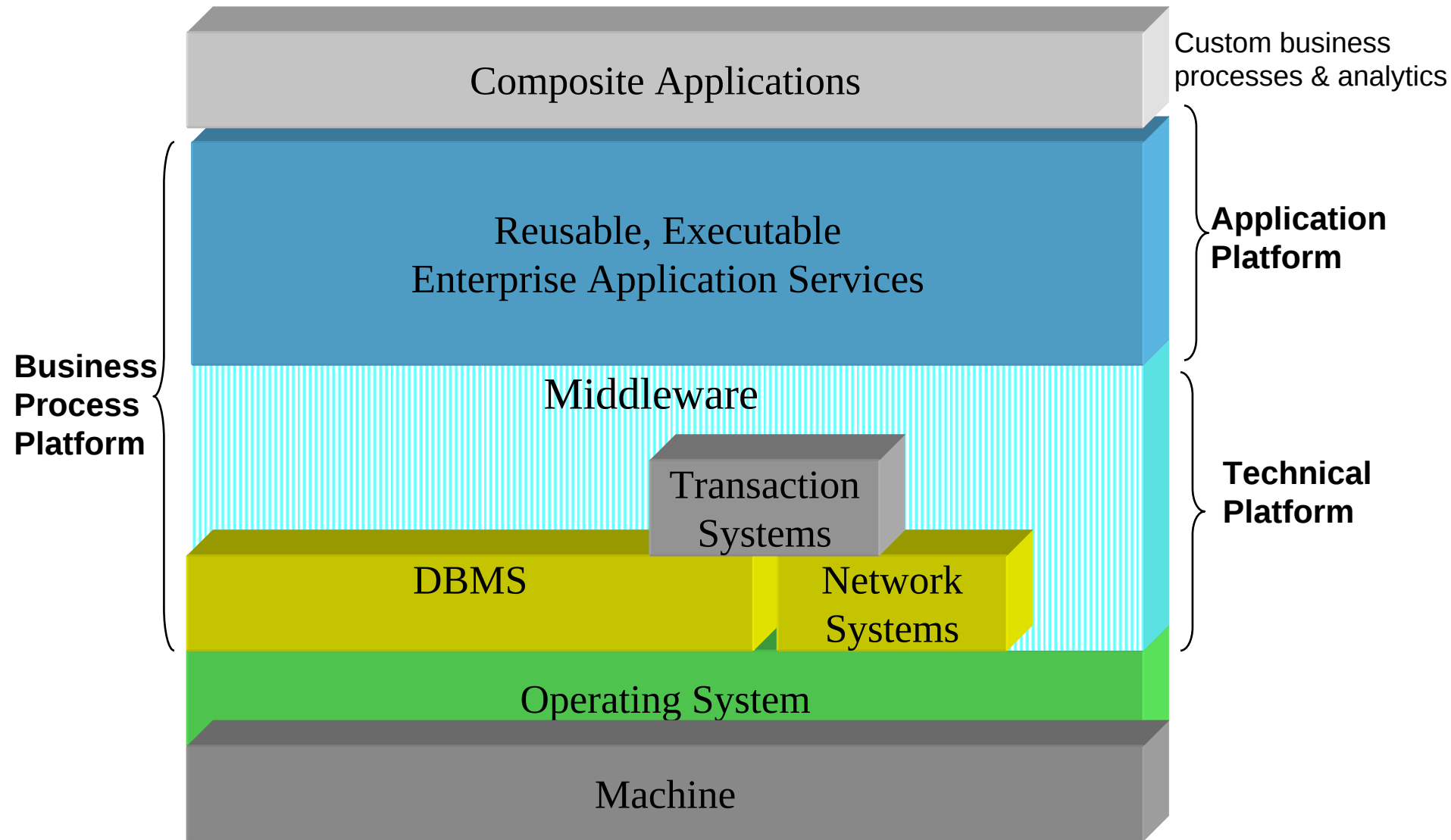
- **Innovative business model and associated processes define an enterprise's competitive advantage**
 - ◆ **Not enough to have a great product**
 - ◆ **Must also have a great business model**
- **Not attractive to simply follow a business process defined elsewhere**
- **Outsourcing all but core business processes**
- **Need flexibility in designing and executing innovative business processes**
 - ◆ **Core business processes**
 - ◆ **Value Chains / Value Networks for accessing mission-critical, non-core processes**

The Technical Platform Stack

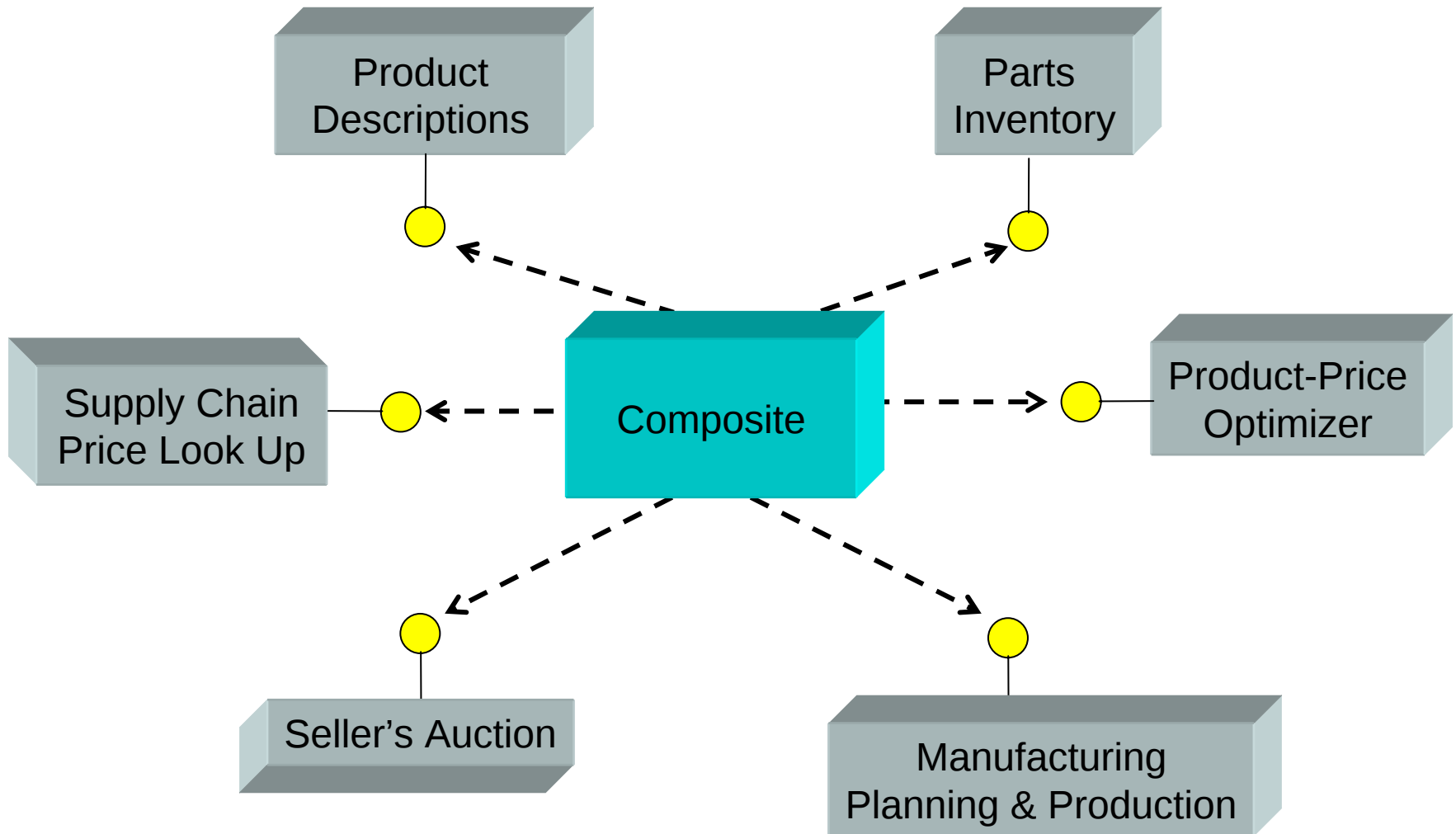


Means A
depends on B





Composite App: Procure-to-Pay, Order-to-Cash, Manufacture-to-Inventory

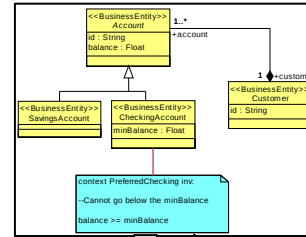


David Burdett, SAP Labs

-- ➤ = Invoke

Model Compilers and the Abstraction Level

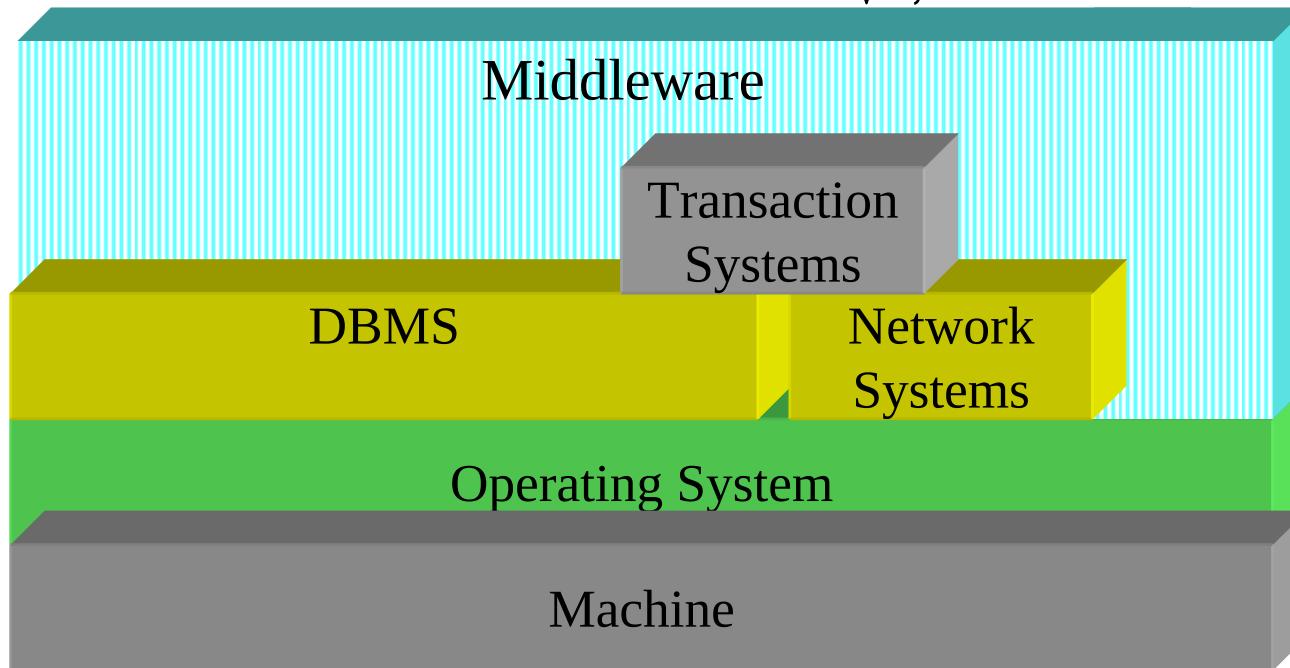
Application Model

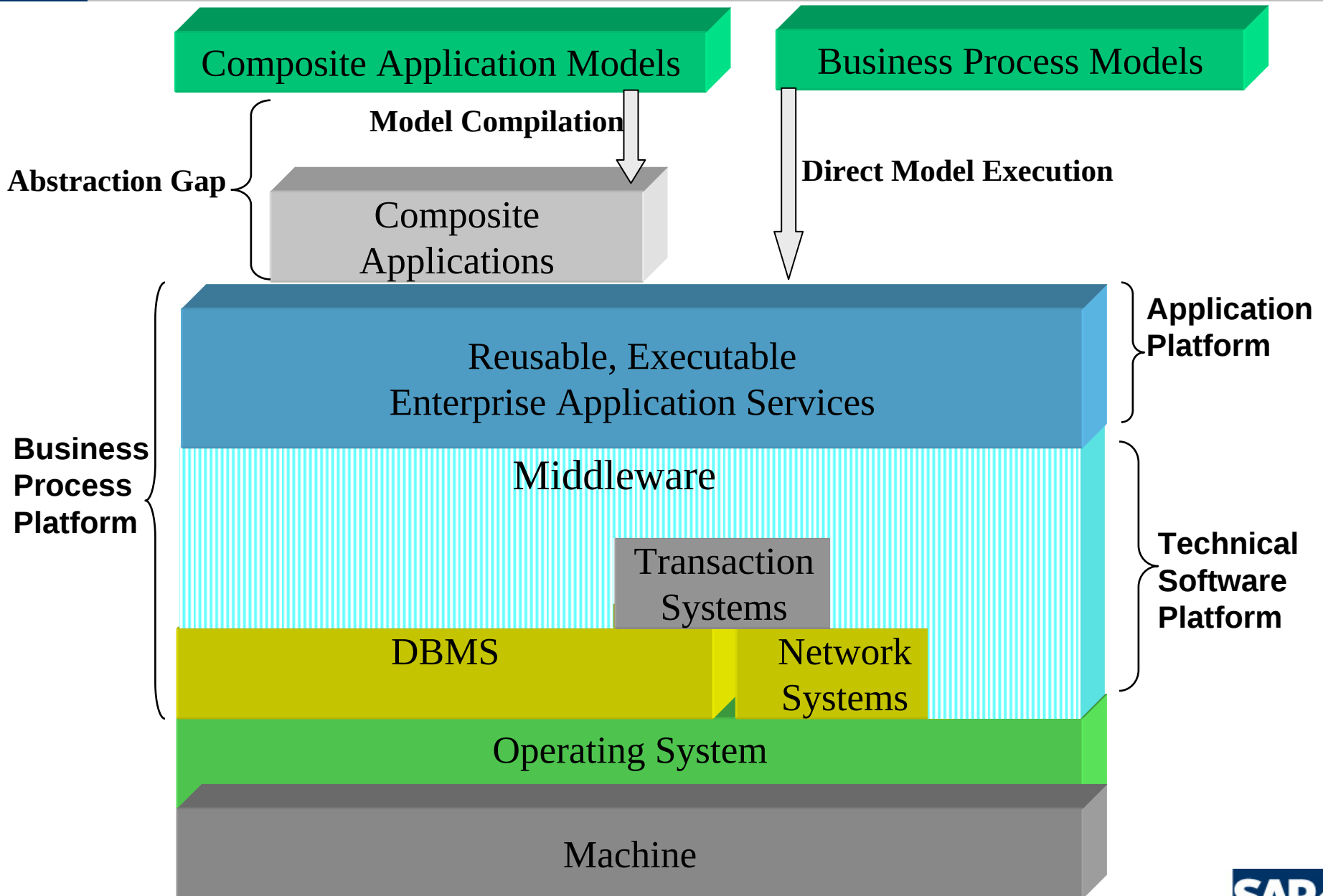


Model Compilation

Abstraction Gap

Level of Abstraction





This jump in the platform abstraction level is more difficult than the last jump (middleware)

- **Just as raising the abstraction level for development languages above 3GLs is more difficult than the last jump to 3GLs**

Crawl, Walk, Run

- **Provide business value at every step**

Semantically thin specifications reach their limits

- **How do you achieve semantic interoperability on top of syntactic interoperability?**
 - ◆ Do collaborating parties have a common understanding the contract of a service?
 - ◆ You can't rely on informal conversations among people
 - ◆ The parties might have different human languages as native tongues
- **How do you find suitable services to compose?**
 - ◆ Suitable functional behavior
 - ◆ Suitable quality of service

Configuration/version/dependency management problems do not go away

- **They can even get worse**

Need a metadata-rich environment to *assist* humans using the business process platform

■ Specifying Constraints

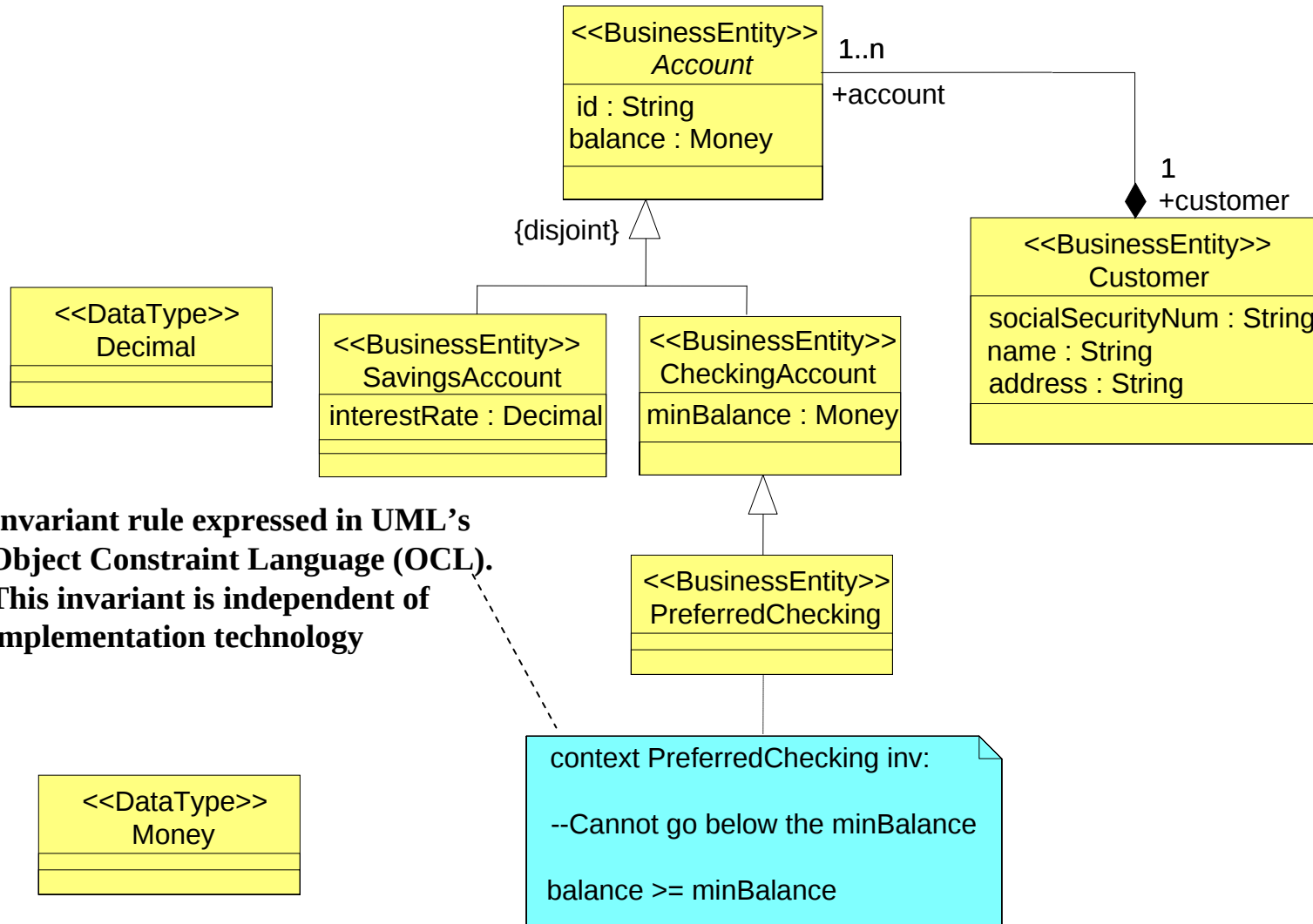
- ◆ Service message/data types specified as precisely as possible
 - Invariants
- ◆ Service operations functional contract specified as precisely as possible
 - Preconditions and postconditions (more numerous than invariants)
- ◆ Using machine-readable, declarative constraint languages
- ◆ We've know how to do this for decades
- ◆ Also improves quality
- ◆ Also need to learn to specify QoS requirements and capabilities as precisely as possible

■ Inferences identify candidates or flag potential problem combinations

- ◆ *Inferences do not have to be 100% certain to be helpful*
- ◆ Let the human decide what to do
- ◆ Record what the human decides
- ◆ Show the next human what the others decided
- ◆ Learn
- ◆ Inference engines require languages for expressing metadata to be *formally grounded*

Abstract Business Information Model: IT Viewpoint

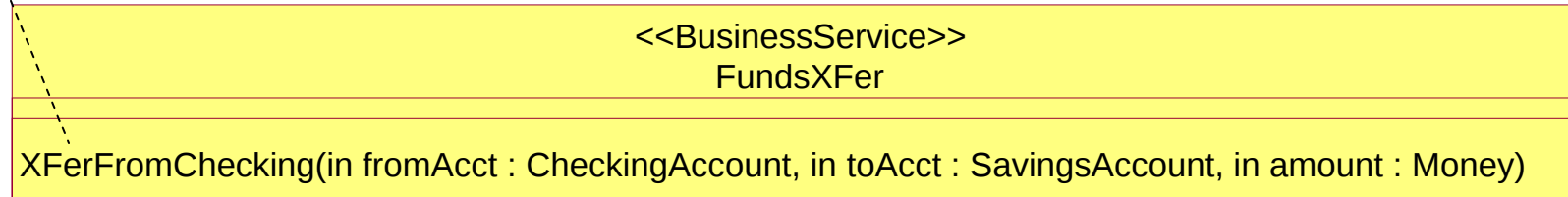
With an Invariant Rule



Abstract Model of a Business Service

With Pre-conditions and Post-Conditions

Signature



context FundsXFer::XFerFromChecking (fromAcct : CheckingAccount, toAcct : SavingsAccount amount : Money) : void
pre:

--There must be sufficient funds in the checking account to support the transfer
fromAcct.balance >= amount

pre:

--The checking account and the savings account must belong to the same customer
fromAccount.customer = toAcct.customer

post:

--The balance of the checking account is reduced from its original amount by the amount of the transfer
fromAcct.balance = fromAcct.balance@pre - amount

post:

--The balance of the savings account is increased from its original amount by the amount of the transfer
toAcct.balance = toAcct.balance@pre + amount

Pre/post conditions—Independent of implementation technology

Operative business rule

■ If the drop-off location of a rental is not the EU-Rent site of the return branch of the rental then it is obligatory that the rental incurs a location penalty charge.

Supporting fact types

- rental has drop-off location
- rental has return branch
- branch is located at EU-Rent site
- rental incurs location penalty charge

Adapted from Semantics of Business Vocabulary and Business Rules, OMG document dtc/06-03-02

Constraints having to do with a component's design-time or deployment-time configuration parameters

- The value of one configuration parameter may constrain the values of others
- Tools can enforce these kinds of constraints, with some limitations
- Tools can also detect collisions among configuration constraints that would result from specific combinations of components
 - ◆ Sometimes detection is certain and sometimes only suspected

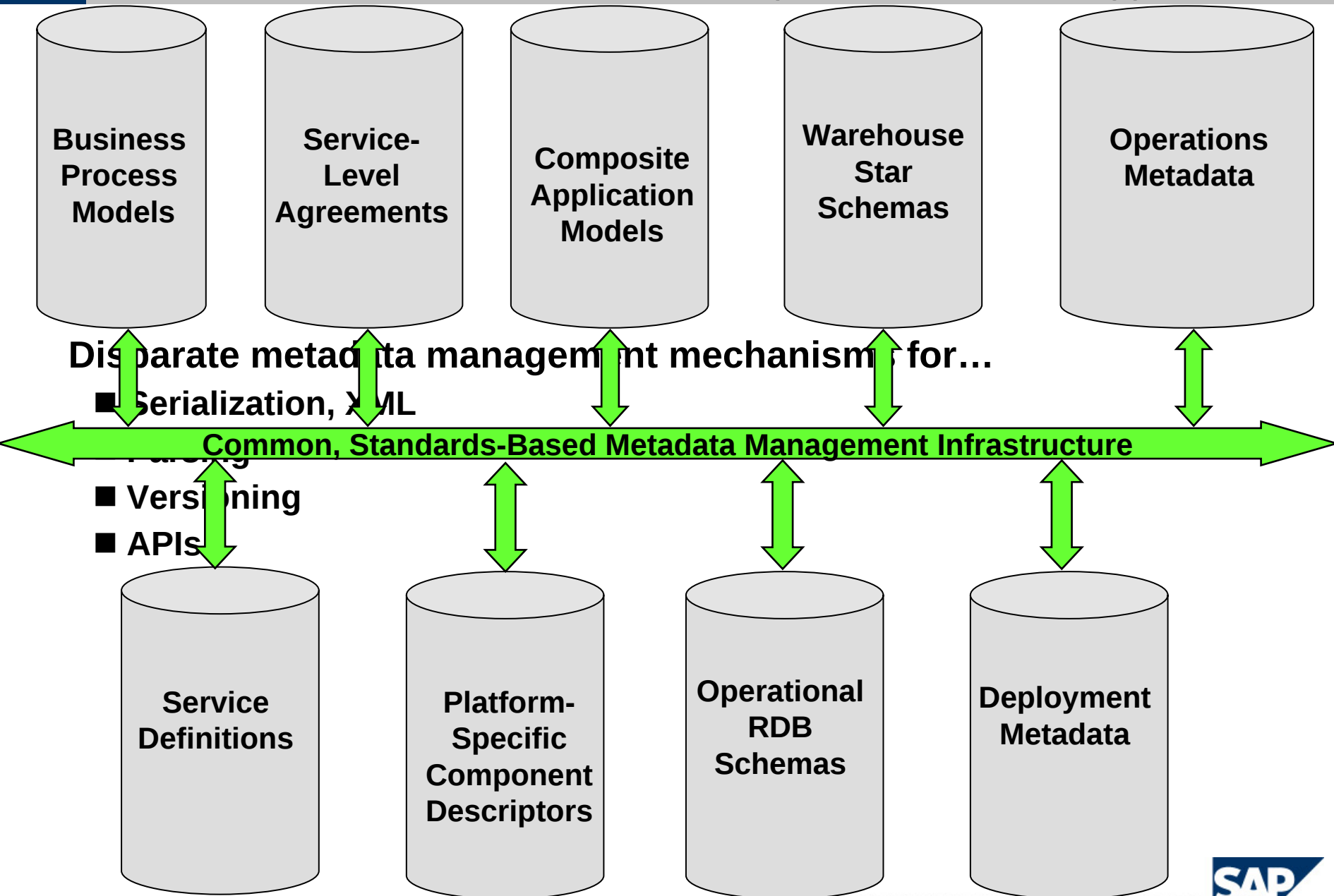
Categories of tool support¹

- *Constraint checking*: Checking whether a particular configuration satisfies the constraints
- *Constraint propagation*: Inferring the values of undecided configuration settings from the values of decided settings
- *Constraint satisfiability*: Checking whether a set of constraints has at least one solution

¹Krzysztof Czarnecki and Chang Hwan Peter Kim, "Cardinality-Based Feature Modeling and Constraints: A Progress Report," Proceedings of the First International Conference on Software Factories, OOPSLA 2005.

Metadata Across the Lifecycle

Model-Driven = Metadata-Driven (With Traceability)



Business process platforms are coming

- **Transition will be gradual, but powerful**
- **Model-driven tools are important for making the platforms usable**

Configuration management has to be faced square-on

Metadata-rich environments, formal grounding, and product line practices needed to manage the complexity

Vigorous competition for a growing pie—if we do this right

Backup

How do you build reusable components?

- Component-based development has proven hard in practice
- How do you anticipate requirements of composite applications?

Product Line Practices

Individual
Product 1

Individual
Product 2

...

Individual
Product n

Individual systems produced via *product development*

Production
Plan

The Sims "Water Line"

Reusable assets for the product line
Created via *core asset development*

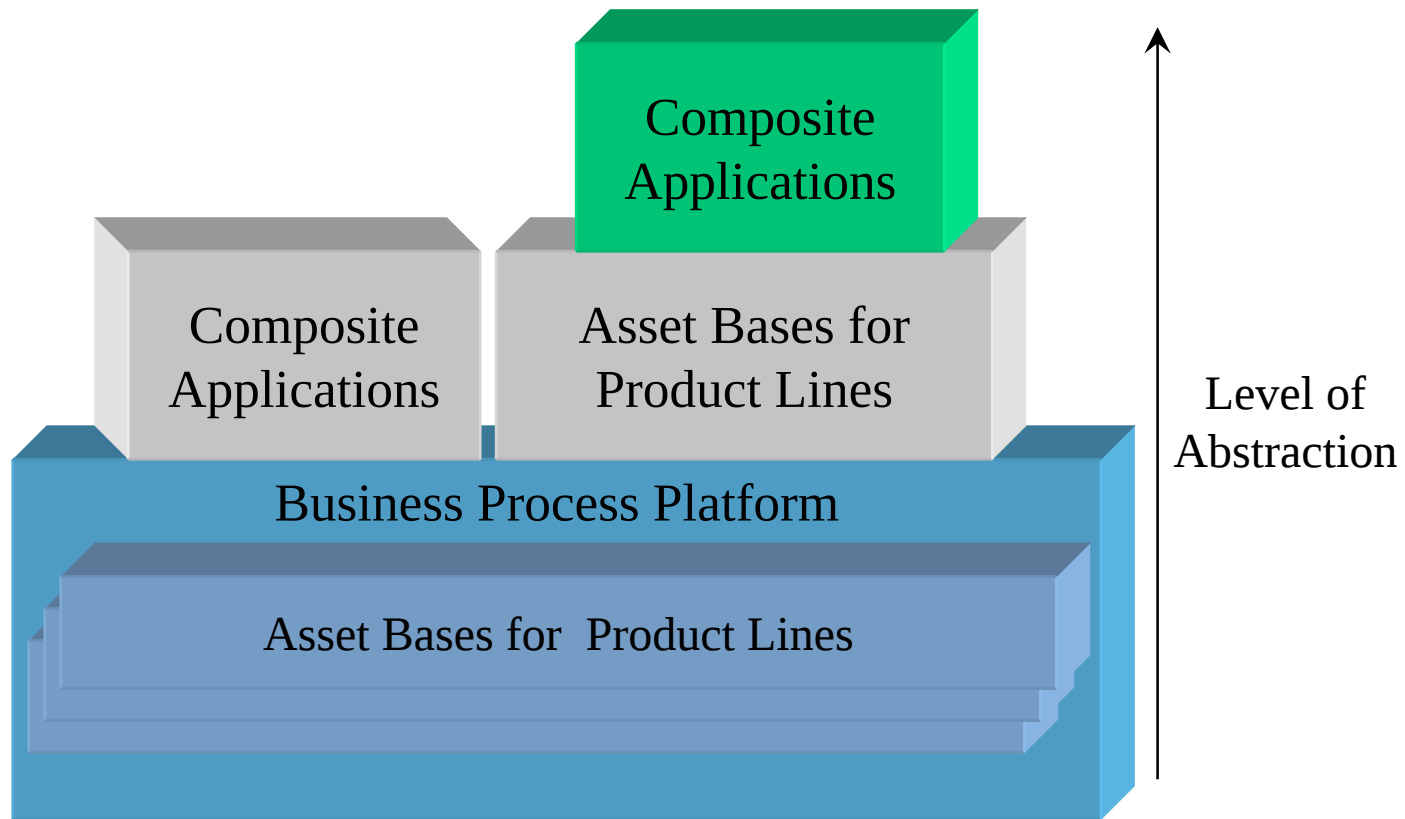
Architecture

Components

Specialized
Compiler(s)

Domain-Specific
Language(s)

Applying Product Line Practices



MS Office is a *desktop application platform*

- Has hundreds of components (has had them for 15 years)
 - ◆ Stateless: e.g. a thesaurus component
 - ◆ Stateful: CRUD operations on office documents and calendars
- Powerful tools for rapid assembly of innovative desktop applications
 - ◆ Visual basic
 - ◆ Code wizards

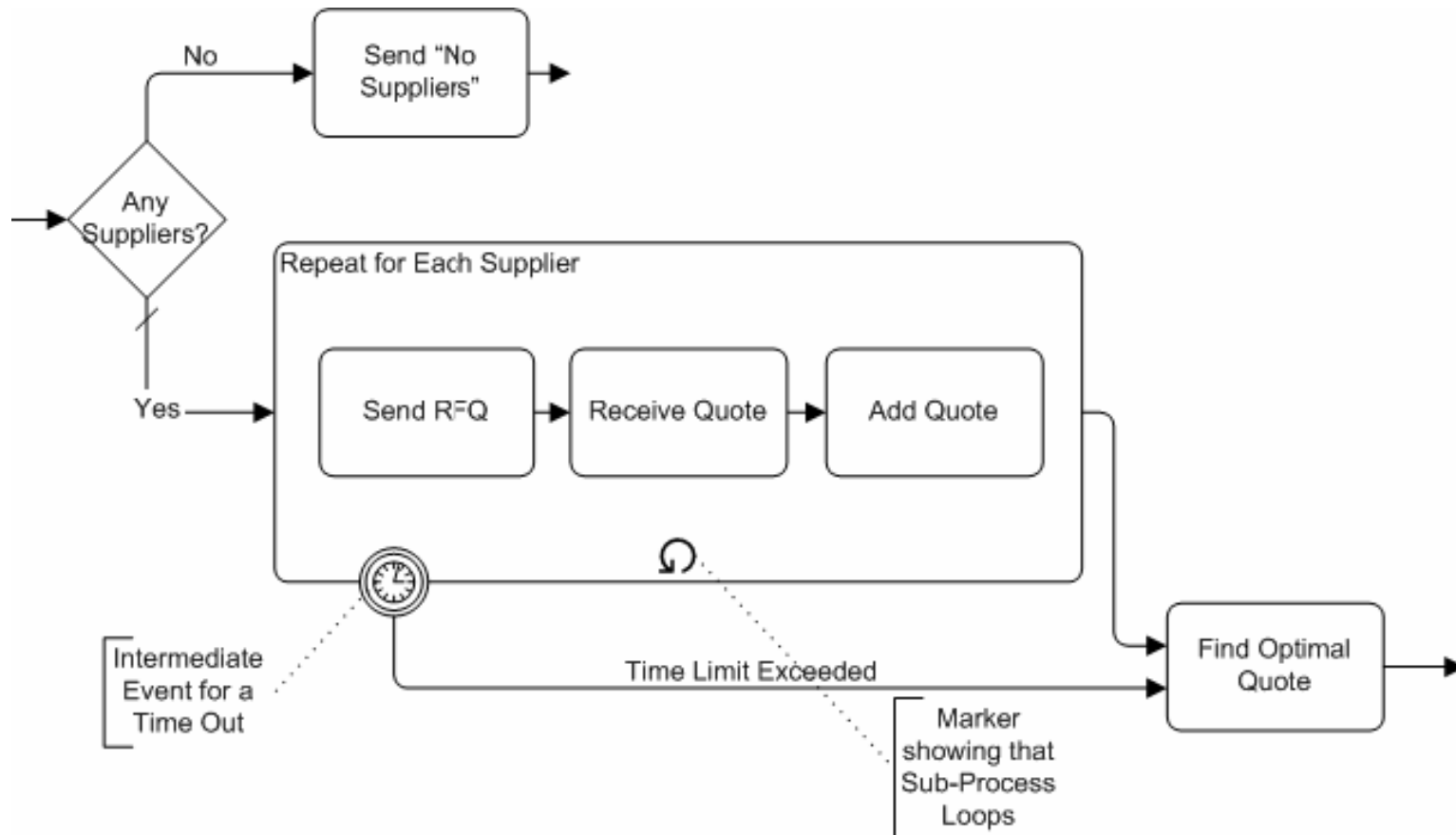
A BPP has an *enterprise application platform*

- Will have hundreds (or more) components
 - ◆ Stateless, e.g. calculations
 - ◆ Stateful: CRUD operations on systems of record
- Model-driven tools
 - ◆ Composite application construction tools
 - ◆ Business Process Management tools

Synergy

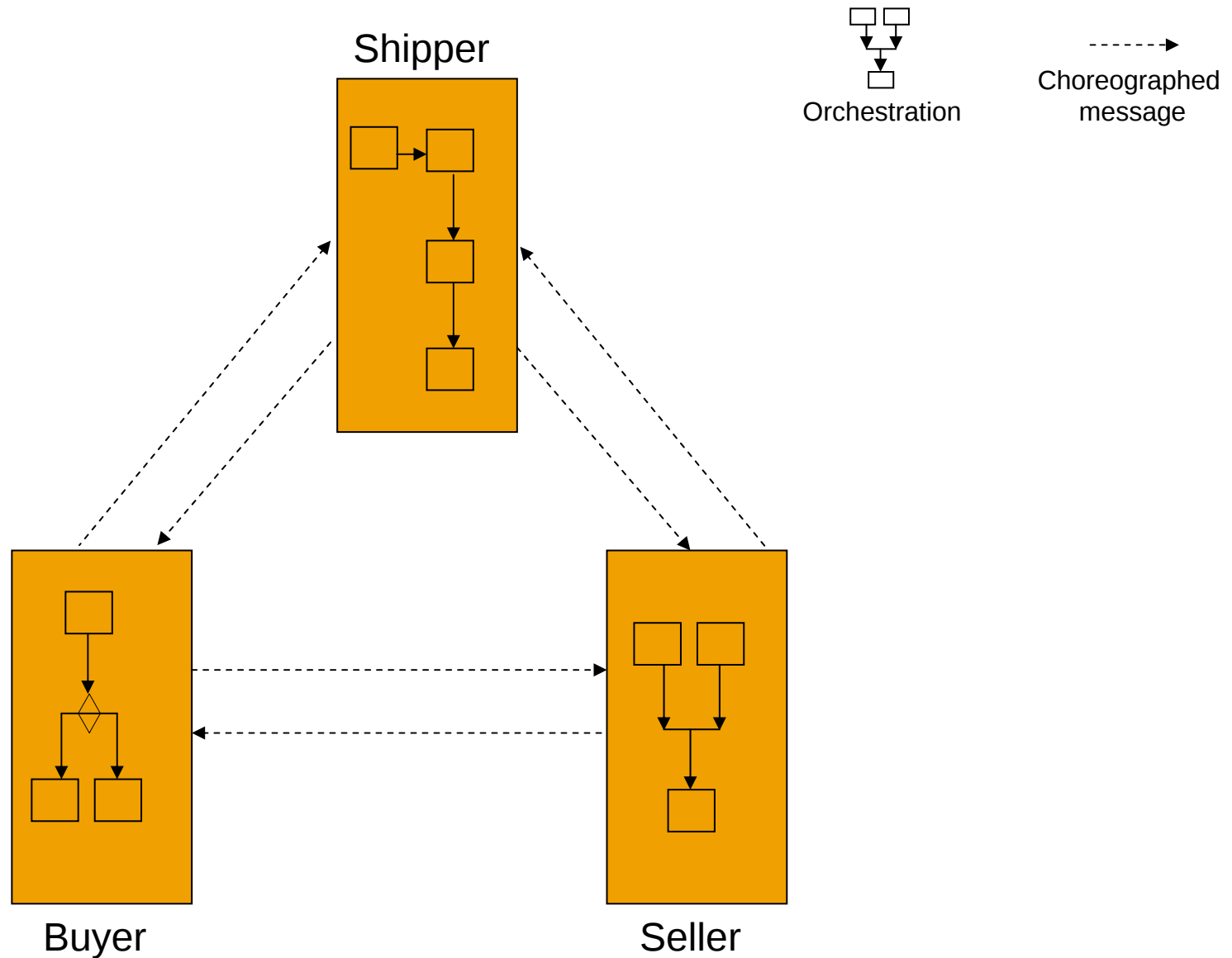
- Integrating desktop and enterprise application platforms
 - ◆ Opens up another order of magnitude of possibilities for innovative composite applications

Business Process Modeling Notation (BPMN)



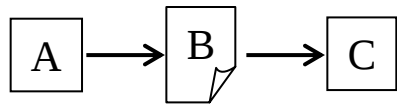
Example from "Introduction to BPMN" by Stephen White, IBM
Available at www.bpmi.org

Collaborative Business Processes



Seeking Formal Grounding for MDA

To Improve Automated Assistance



Means tool A outputs B, and B serves as input to tool C.

Generic UML Modeling Tool

Ontology Definition Metamodel (ODM)

UML Model Using UML Profile

Generic UML Model

Native Semantic Web Ontology Development Tool

MOF/XMI Based Tooling (e.g. Semantic Web Eclipse Plug-In)

UML-OWL Bridge

Native OWL Document

XMI OWL Document

ER Tool

OWL-XMI Bridge

ER-OWL Bridge

ER Model

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