



Model-Driven Business Process Platforms

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SAP Labs

Economic Drivers

The Evolution of the Software Platform

Why This is Difficult

Meeting the Challenges: Metadata

Meeting the Challenges: Product Lines

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Meeting the Challenges: Product Lines

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

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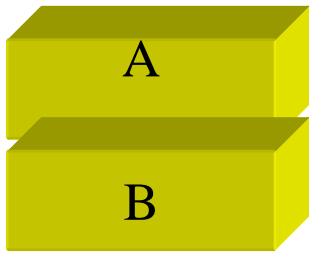
The Evolution of the Software Platform

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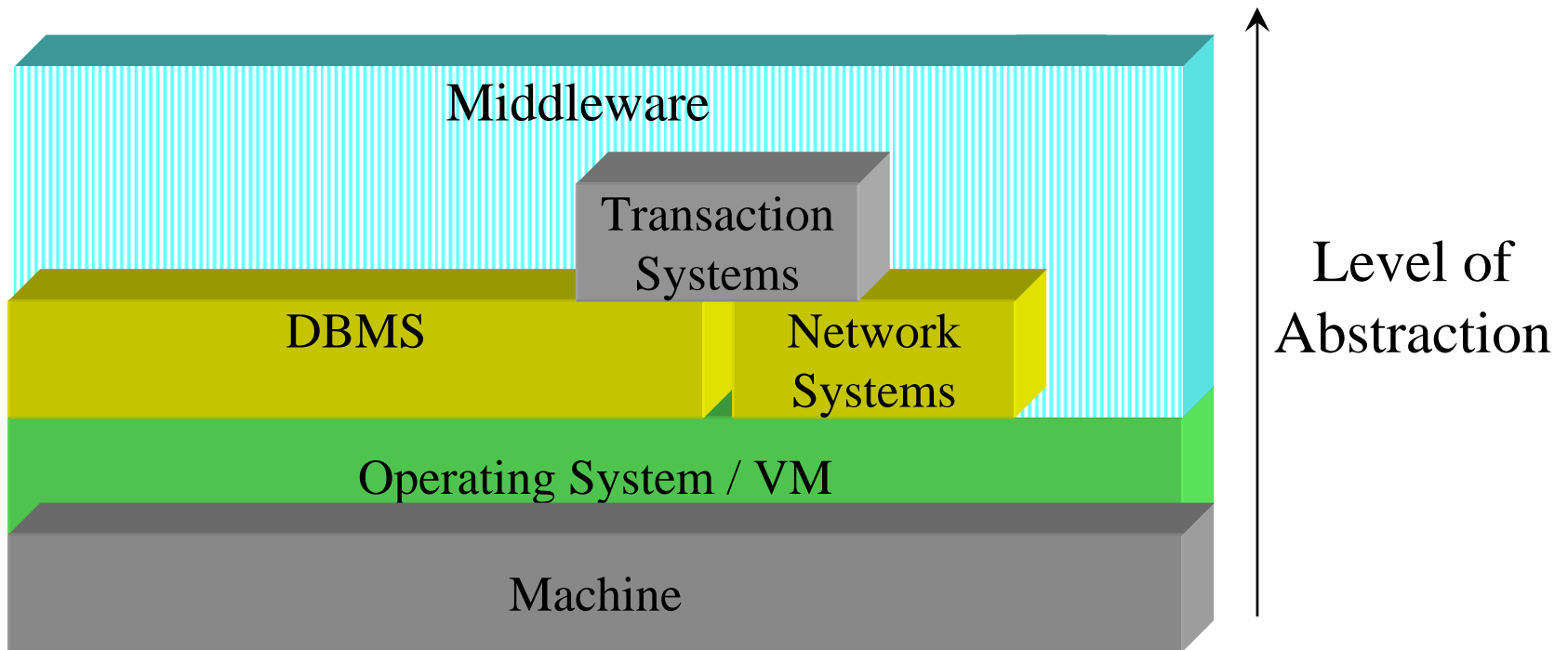
Meeting the Challenges: Metadata

Meeting the Challenges: Product Lines

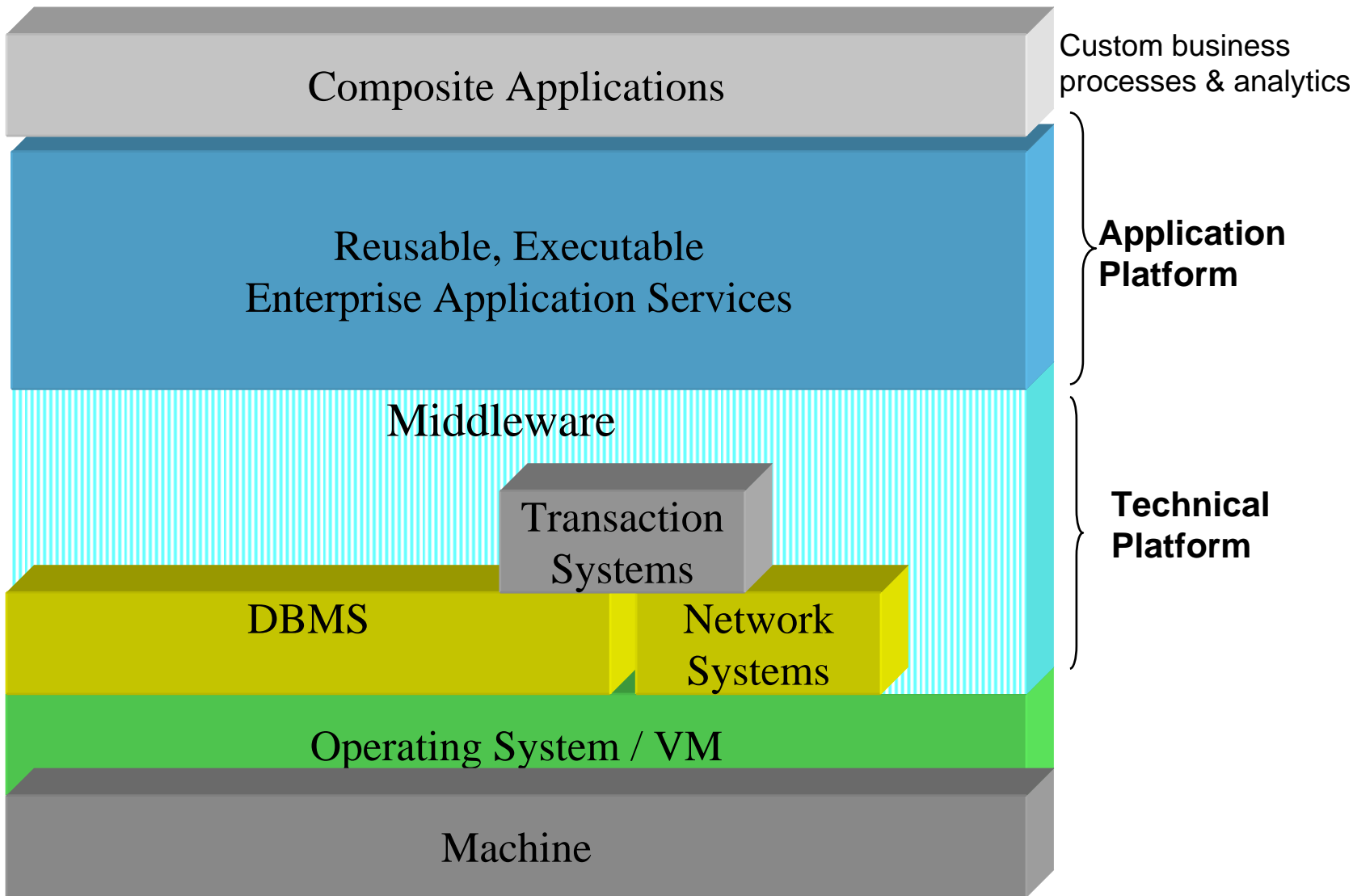
The Technical Platform Stack



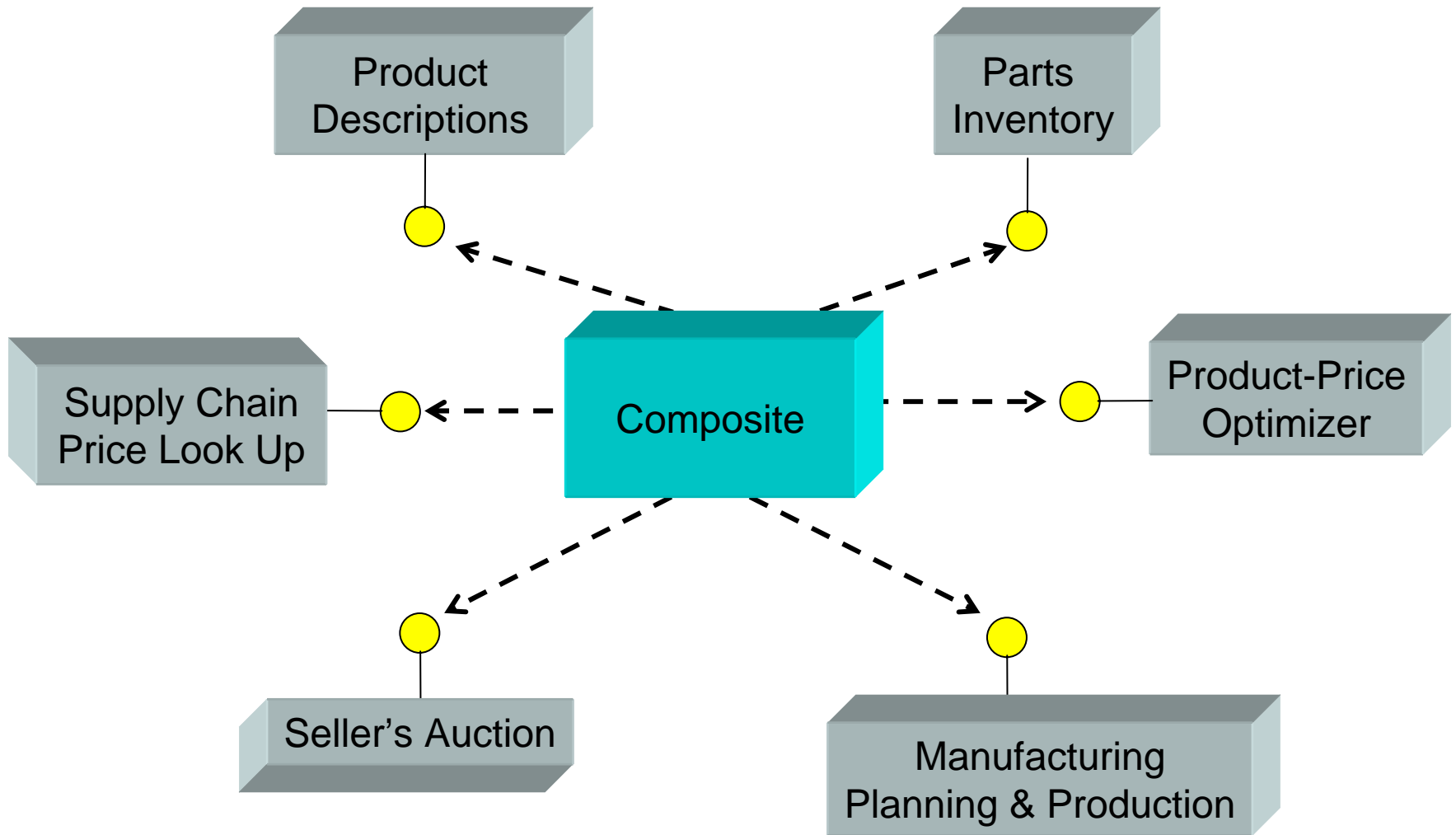
Means A
depends on B



Business Process Platform



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

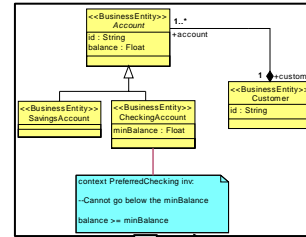


David Burdett, SAP Labs

--> = Invoke

Model Compilers and the Abstraction Level

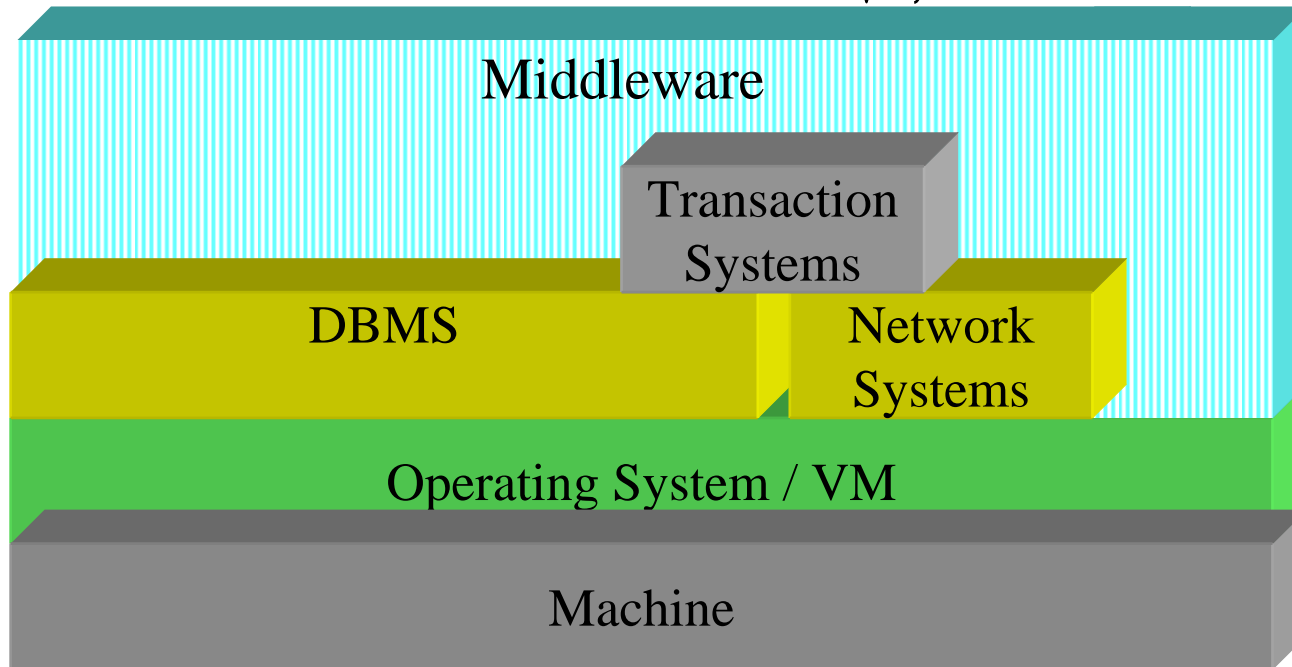
Application Model



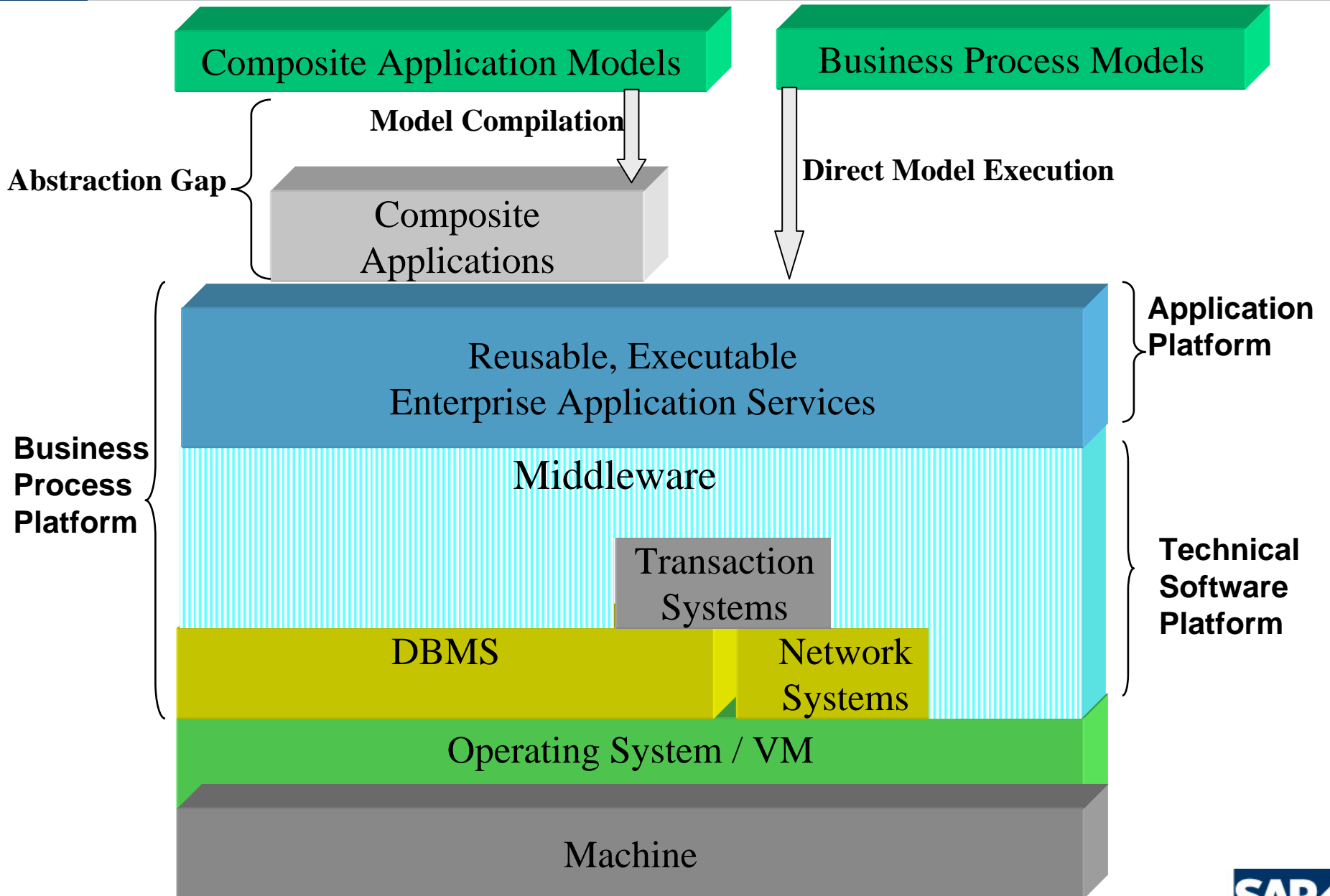
Model Compilation

Abstraction Gap

Level of Abstraction



Raising the Level of Abstraction



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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?
- **Same for reusable business processes**

How do you build reusable components?

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

Configuration/version/dependency management problems do not go away

- **They can even get worse**

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

■ Design by Contract™

- ◆ Service message 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

■ Capture dependencies in metadata

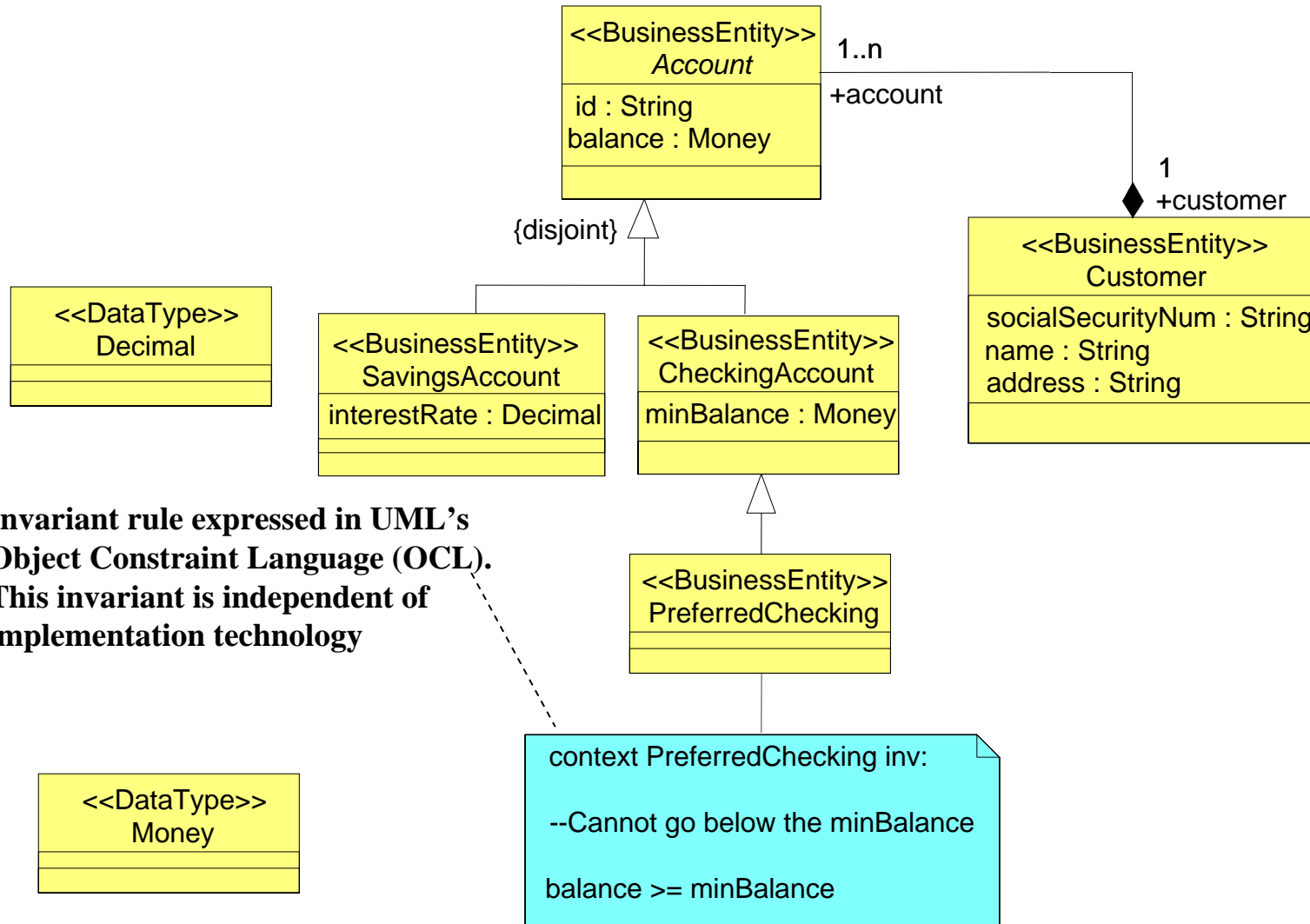
- ◆ Don't bury them in code

■ Formal grounding of languages

■ Inferences identify candidates or flag potential problem combinations

- ◆ Let the human decide what to do
- ◆ Record what the human decides
- ◆ Show the next human what the others decided
- ◆ Learn

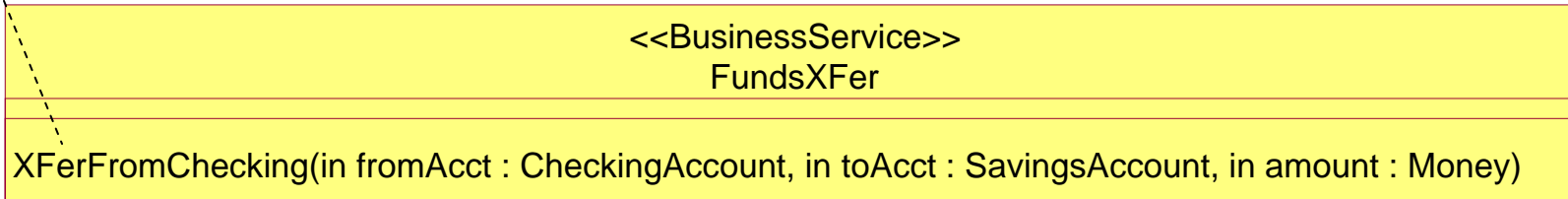
Business Information Model With an Invariant Rule



Formal Abstract Model of a Business Service

With Pre-conditions and Post-Conditions

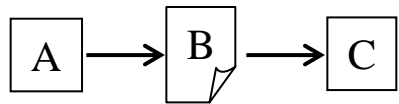
Signature



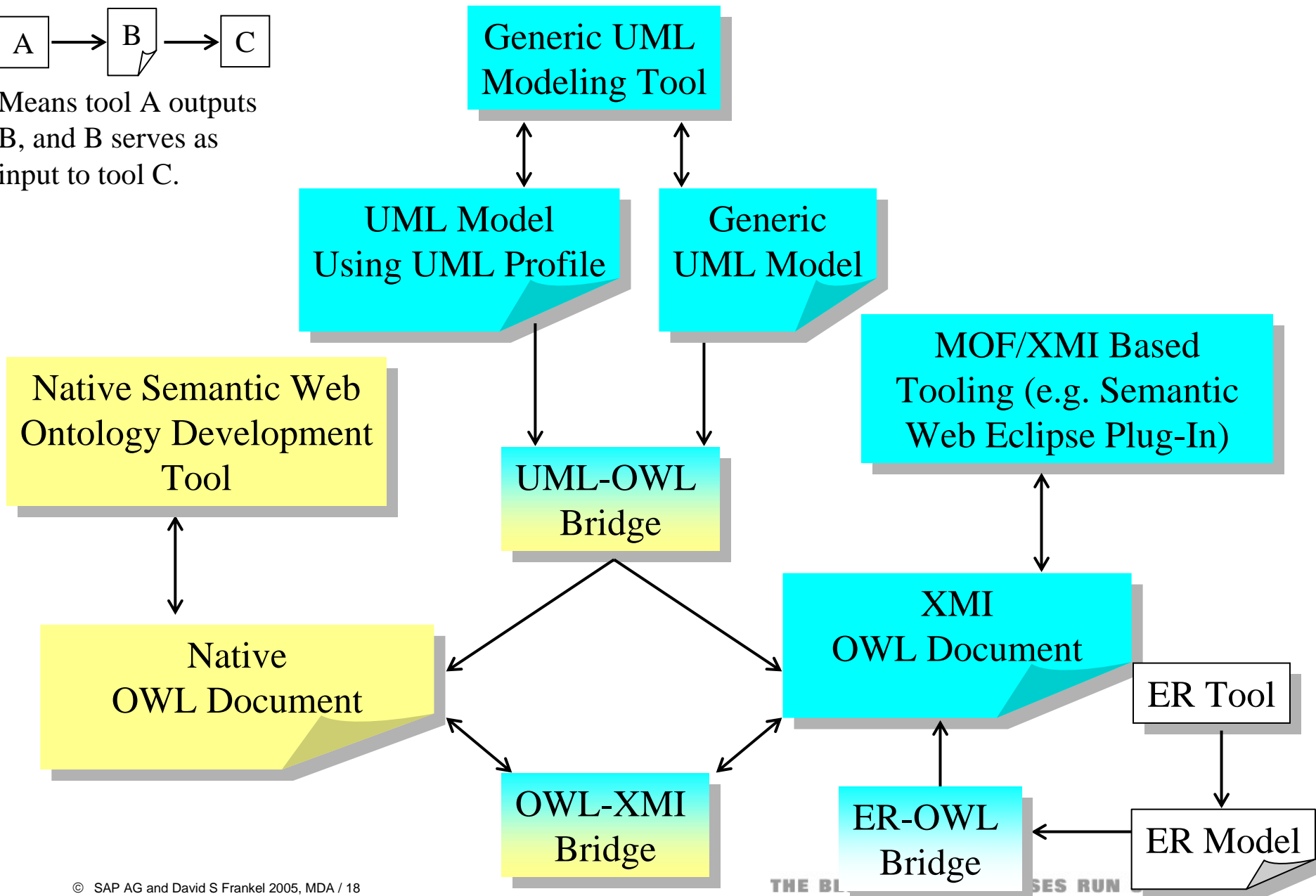
```
context FundsXfer::XFerFromChecking (fromAcct : CheckingAccount, toAcct : SavingsAccount amount : Money) : void
pre:
--There must be sufficient funds in the checking account to support the transfer
fromAcct.balance >= amount
pre:
--The checking account and the savings account must belong to the same 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

Bridging the Semantic Web and MDA Worlds

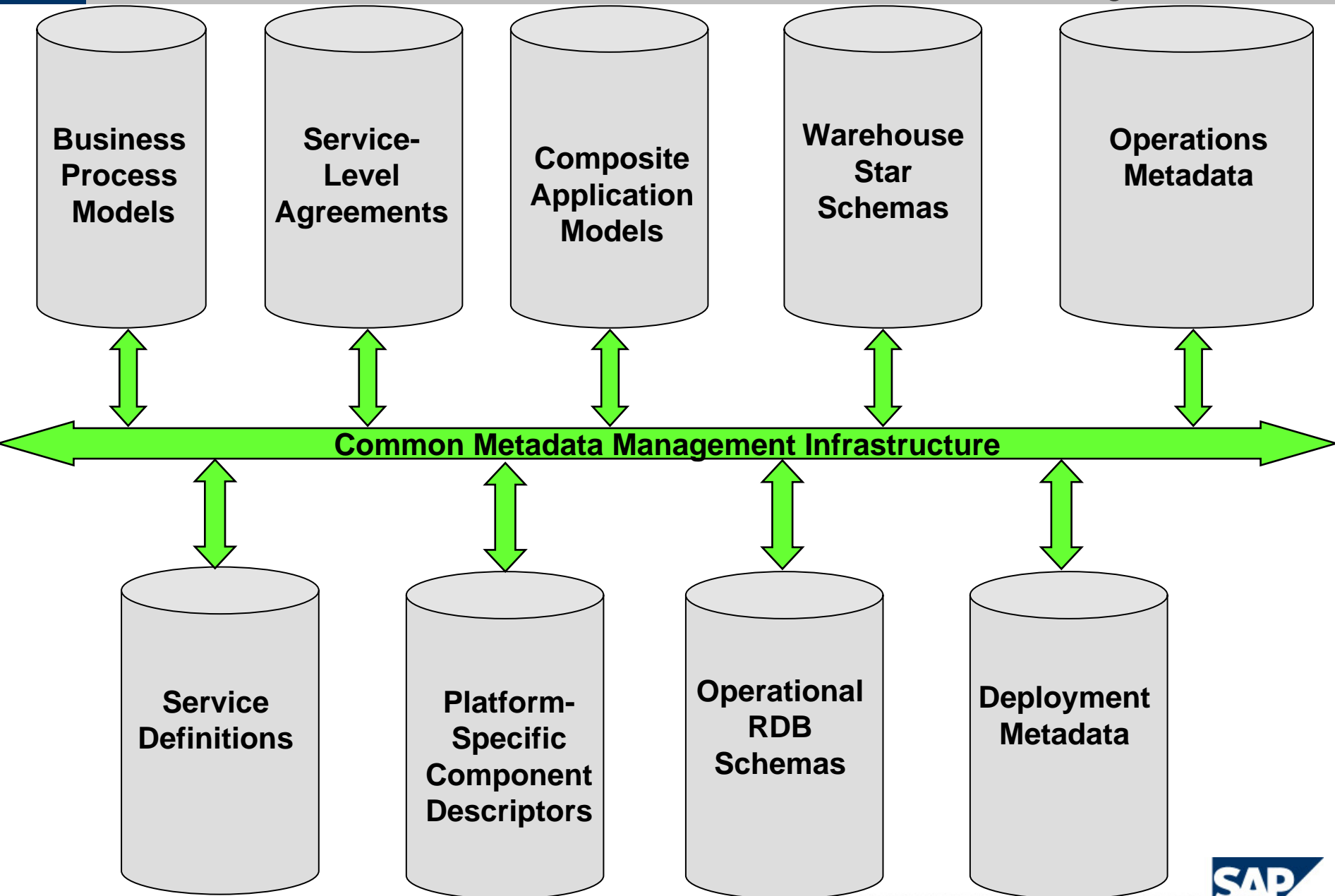


Means tool A outputs B, and B serves as input to tool C.



Metadata Across the Lifecycle

Model-Driven = Metadata-Driven (With Traceability)



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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*

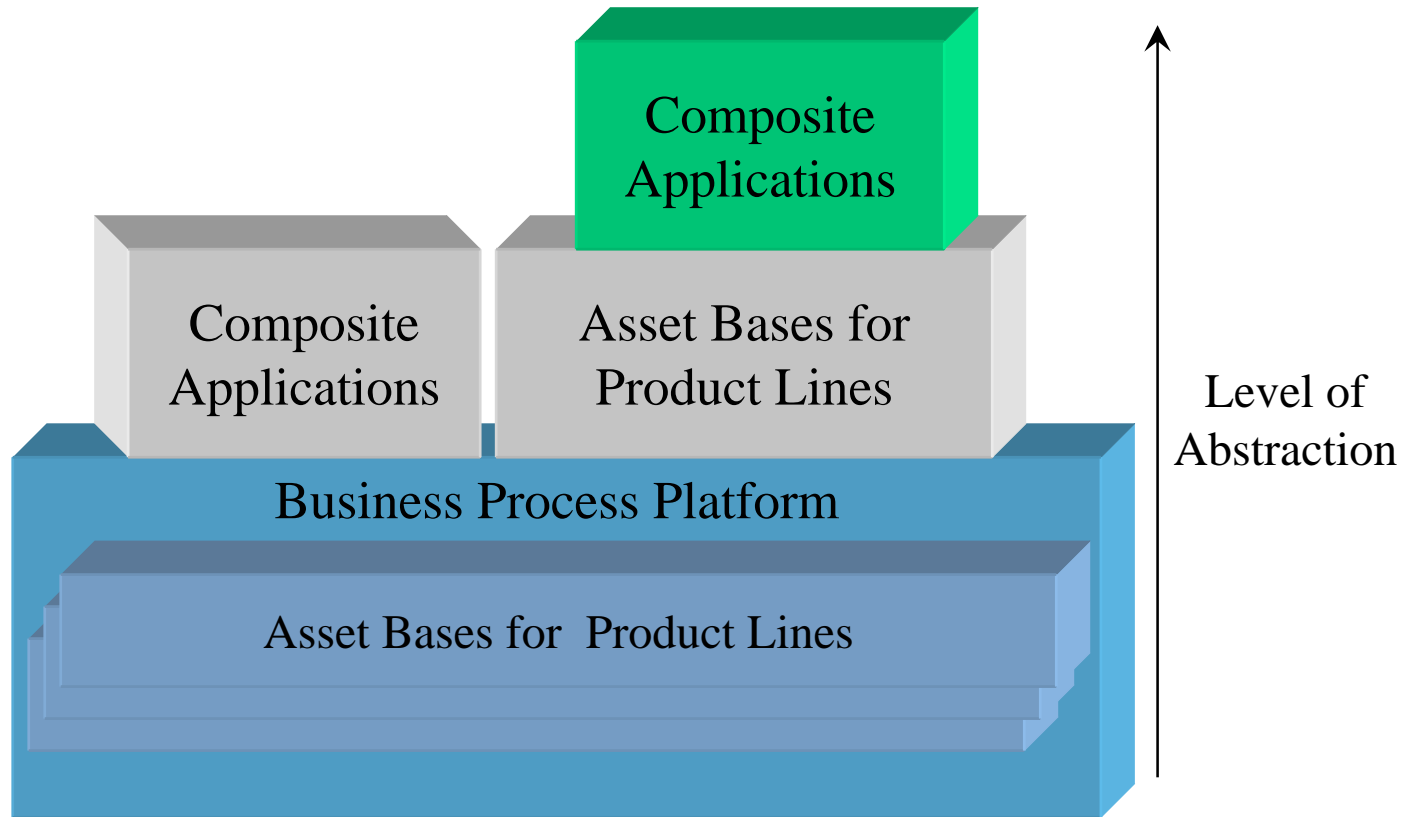
Architecture

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
 - ◆ 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 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 environment, formal grounding, and product line practices needed to manage the complexity

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

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