Business Processes Modelling

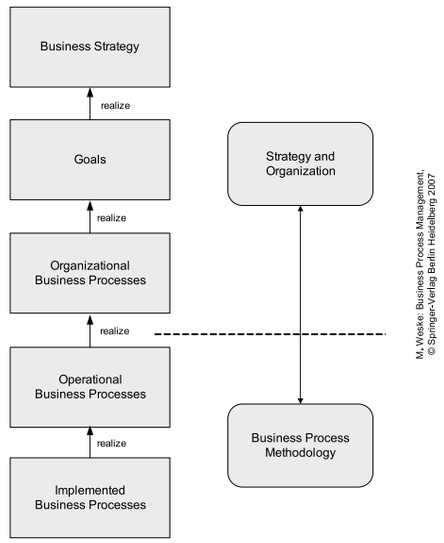
MPB (6 cfu, 295AA)

Roberto Bruni

http://www.di.unipi.it/~bruni

06 - Methodology

Objective



Coarse-grained methodology for developing business process management solutions

Guidelines for process designers to plan and conduct business process management projects

Ch.1.3, 2, 8 of Business Process Management: Concepts, Languages, Architectures

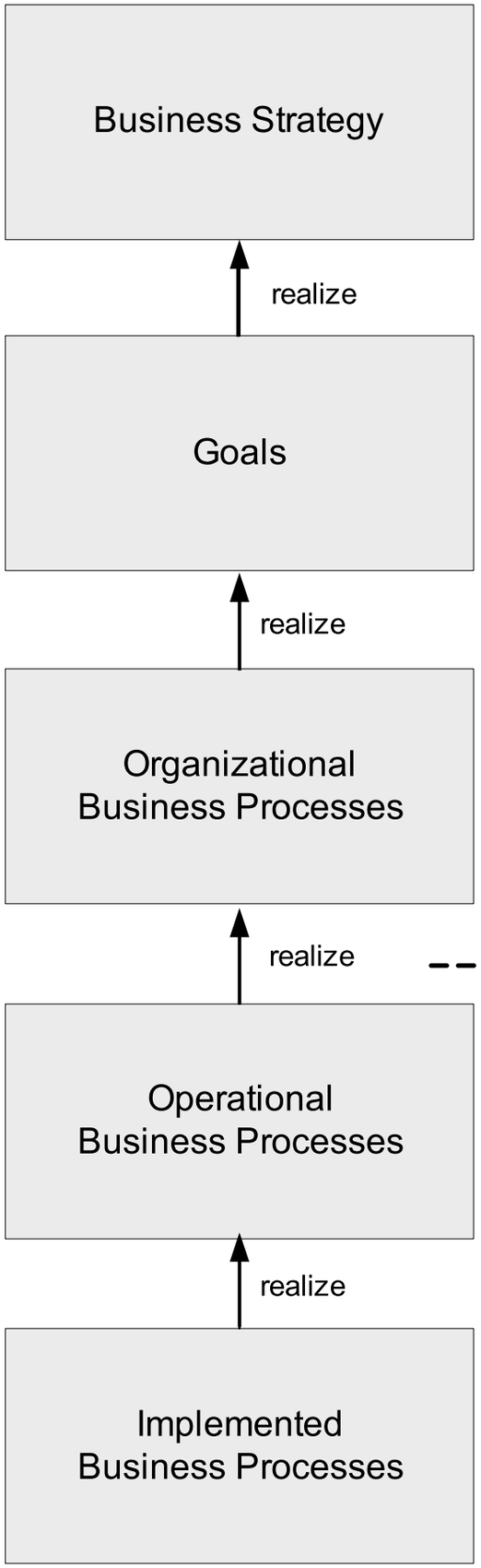
Levels of business processes

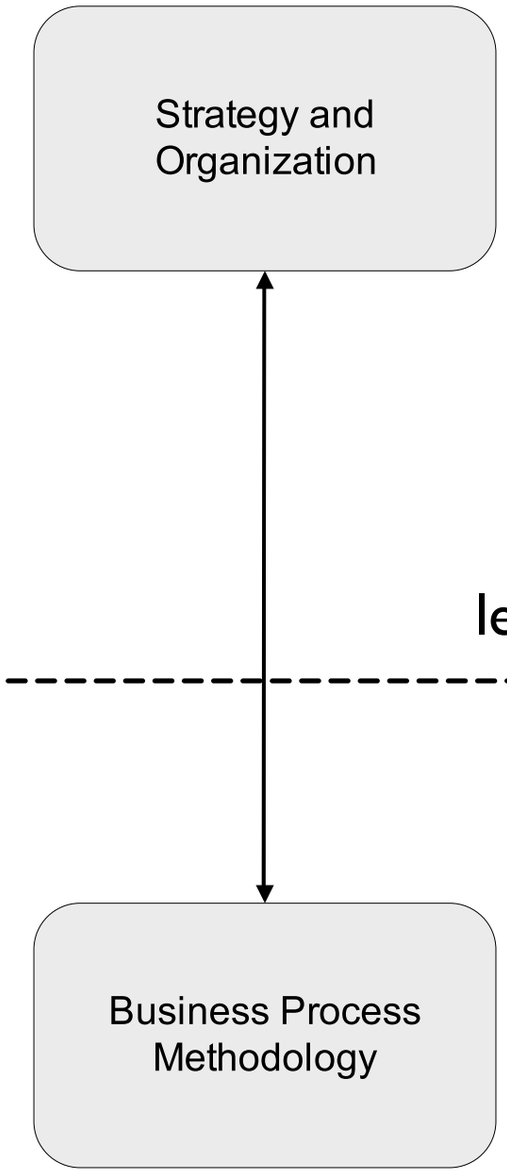
Focus on overall operations of the company

Determine the **operational goals,** such as focus on customers, cost efficiency, leadership in innovation or quality or price

Focus on **individual business processes**

Levels of business processes





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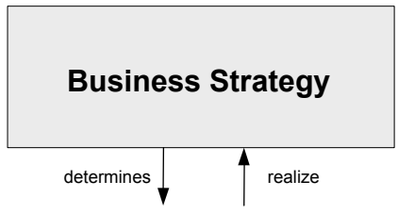
Levels of business processes



long-term company strategies
to develop sustainable success in the market

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Some business strategies

Competitive Advantage: Gained over competitors by offering consumers better value

You increase value by lowering prices or
increasing benefits and services to justify the higher price.

Cost Leadership: Compete for the largest number of customers through price.

Minimize costs to the company and minimize costs to the customer
without decreasing profits.

Standardization needed: generic goods or services sold at the lowest prices.

Differentiation Strategy: Product or service with distinctive qualities valued by customers

Attract customers because products are set apart from the competition.

Leading scientific research needed:
highly skilled and creative product development team;
a strong sales and marketing team.

Focus Strategy: serve a limited group of customers better than any competitor

Concentrate on a particular customer, product line, geographical area.

A focus strategy works well for small but aggressive businesses.

Levels of business processes

long-term company strategies
to develop sustainable success in the market

define **operational goals** that
contribute to the realization of the business strategy

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Operational goals

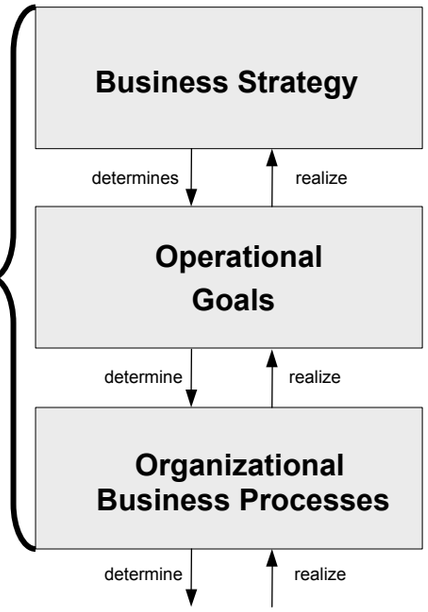
Management implements the business strategy by defining operational goals.

Profitability:
to increase revenue while limiting expenses

Customer Service:
to improve response time to customer complaints

Efficiency:
to implement a new shipping procedure that improves delivery time

Levels of business processes



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define operational goals that
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high-level **processes in textual form**:
input, output, expected results, dependencies

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Organizational process

Top-level: Form-based description of organizational business process (black-box view, internal structure not shown)

Process Name: Product Development Process	**Responsible Process Manager:** Dr. Myers
From: Requirements **To:** Rollout	**Type:** Development Project
Process Inputs: Requirements Document, Project Plan, Budget Plan, Prototyps	**Supplier Processes:** Product Planning Process, Innovation Process
Process Results: Integrated and completely tested innovative product with complete documentation	**Customer Processes:** Order Management Process, After-Sales Service Process

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Intra-organizational process

No interaction with business processes performed by other parties (single organization processes)

Primary focus:
streamlining of internal processes,
eliminating activities that do not provide values,
allocating activities to persons who are competent and skilled enough

Orchestration!

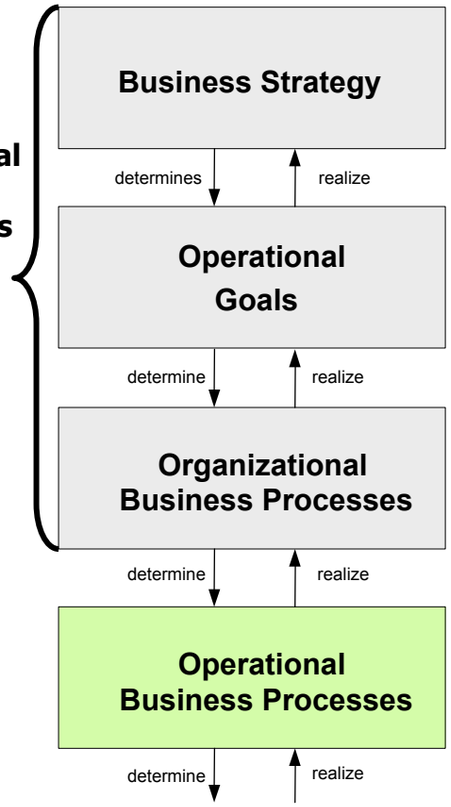
Inter-organizational process

Business-to-business process
(multiple organizations)

Primary focus:
communication aspects,
legal matters,
interoperability of heterogeneous software infrastructures

Choreographies!

Levels of business processes



Informal & semiformal techniques: plain text + diagrams + forms-based

BPM level

long-term company strategies
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define operational goals that
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high-level processes in textual form:
input, output, expected results, dependencies

activities and relationships are specified,
but implementation aspects are disregarded

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Guidelines

Recursively:

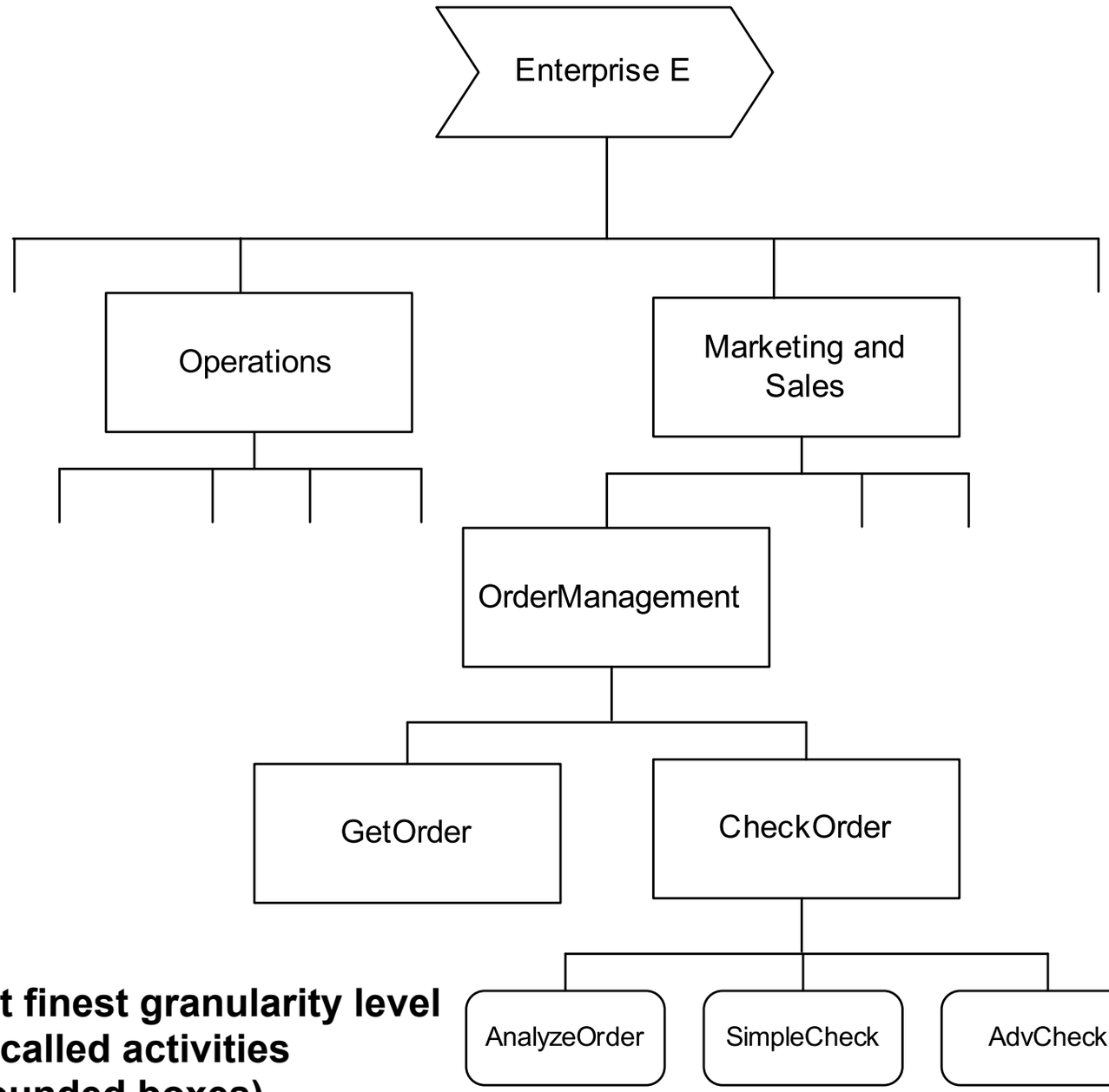
Collect observations
Classify information
Validate findings with stakeholders
Refine artefacts

Guidelines

Gather information (in textual format)
about the business process environment,
including project goals, project team and
legislative regulations

Prepare a domain ontology to fix
a common understanding of terms and concepts
in the application domain

Functional decomposition



Functions at finest granularity level are called activities (rounded boxes)

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Who is the customer?

Each business process starts and ends with a customer who requests a product and who receives the product as a result of the business process

(remind that a customer can be internal to the organization, e.g. a department)

Who is the owner?

Each business process is assigned a process owner, who is responsible for the process

(individual in charge of making sure that process instances are conducted correctly and that business goals are met)

Which tasks and roles?

Each business process comprises a set of activities needed to realize the business goals

Each task may need some specific abilities to be carried out

Which dependencies?

Execution constraints are used to order activities in the business process in a way that enterprise resources are used efficiently and at the same time the business goals are met

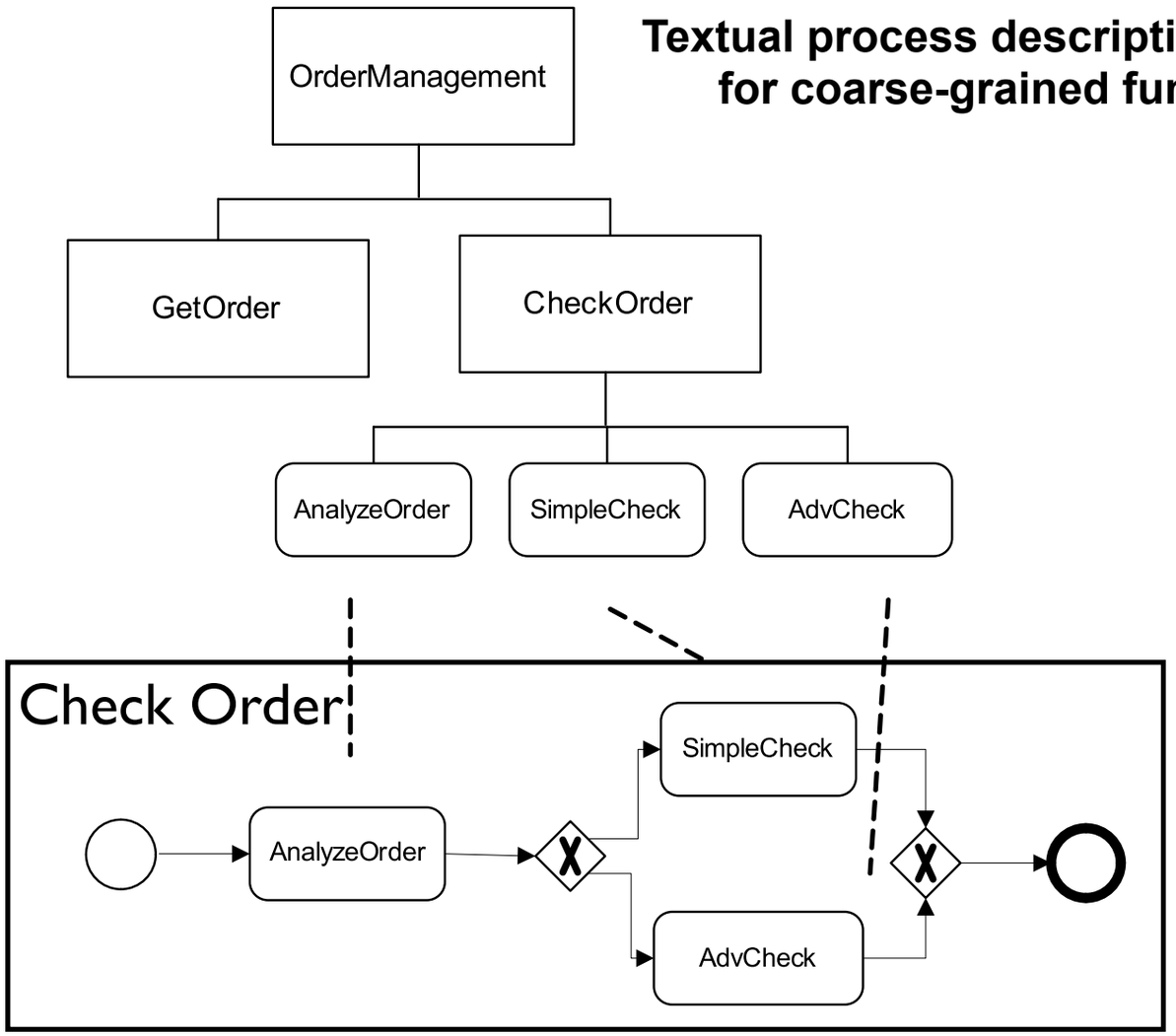
(process orchestration language are used to express process execution constraints)

Guidelines

Represent the (textual) gathered information as business process model(s)

Exploit the model as a **communication basis**
to consolidate findings and
improve the organizational/technical environments
(e.g., acquire new skills, move to service-orientation)

Structuring business processes



Textual process descriptions are ok for coarse-grained functions

Operational business processes are ok for fine-grained functions

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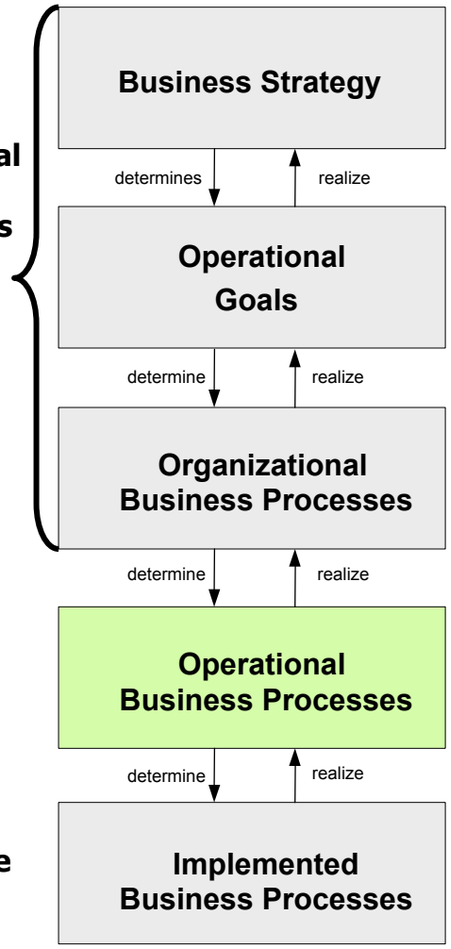
Repetitive vs collaborative

Highly **repetitive processes**,
fully automated, no human involvement:
process automation can pay off
(e.g. online airline ticketing)

On the opposite, **for rarely enacted processes it is questionable if the effort of modeling can pay off**
(e.g. vessel design: cost per instance too high)

Collaborative business processes,
low degree of repetition, involved persons are at the centre of attention: allow to track relationships
(human activities, no cost for automation)

Levels of business processes



long-term company strategies
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define operational goals that
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high-level processes in textual form:
input, output, expected results, dependencies

activities and relationships are specified,
but implementation aspects are disregarded

executable/technical/organizational environments
(from written policies and procedures to enactment platforms)

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Platform selection

Select the platform on which the business process will be enacted and possibly
enhance the process model with additional information to make it executable

It can be a technological platform
but also a non-technical one
(e.g., written business policies, manual procedures, service-oriented architecture)

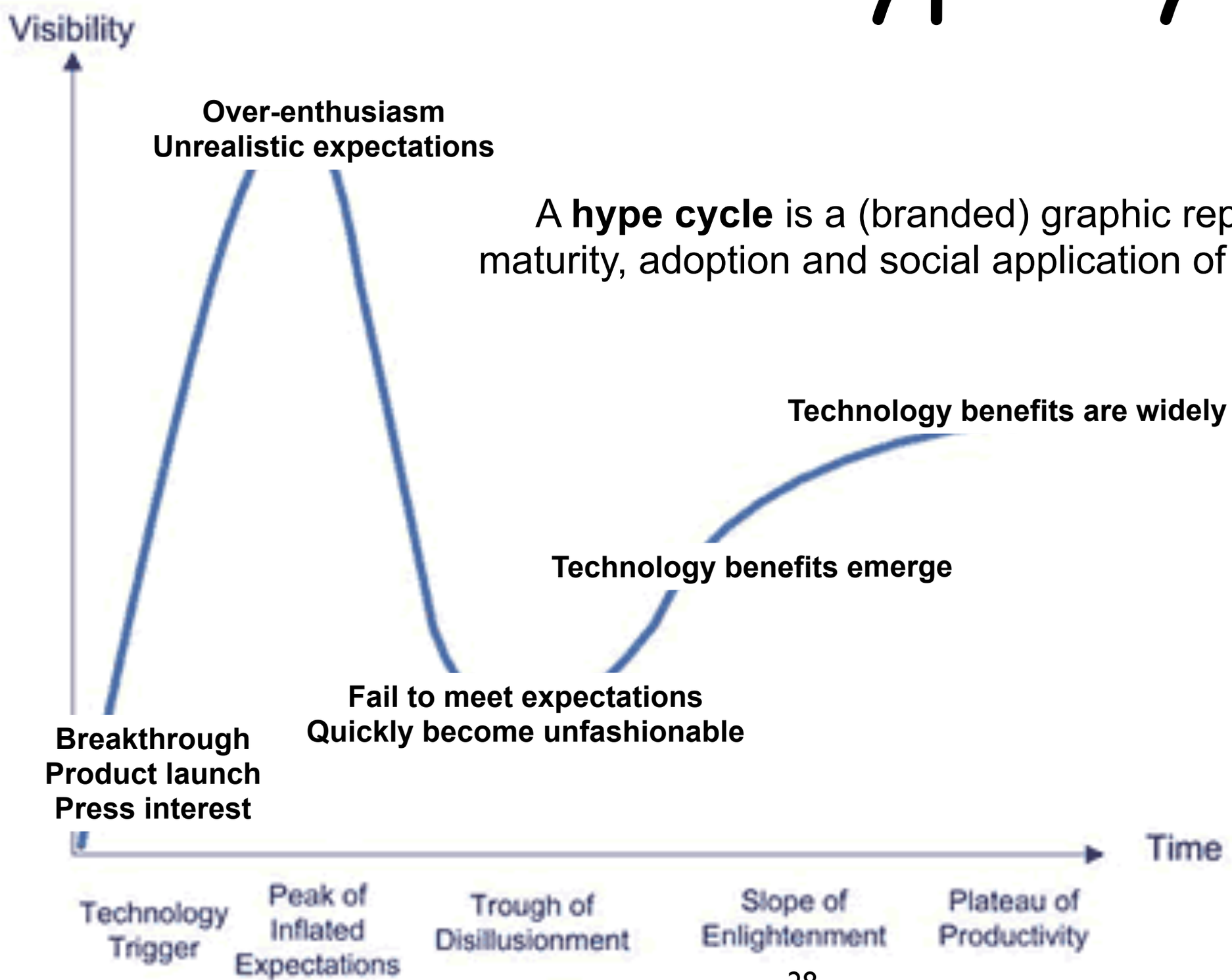
Guiding principles

Modularity and information hiding (encapsulation, interfaces, reuse, maintainability, response to change)

Software Architecture

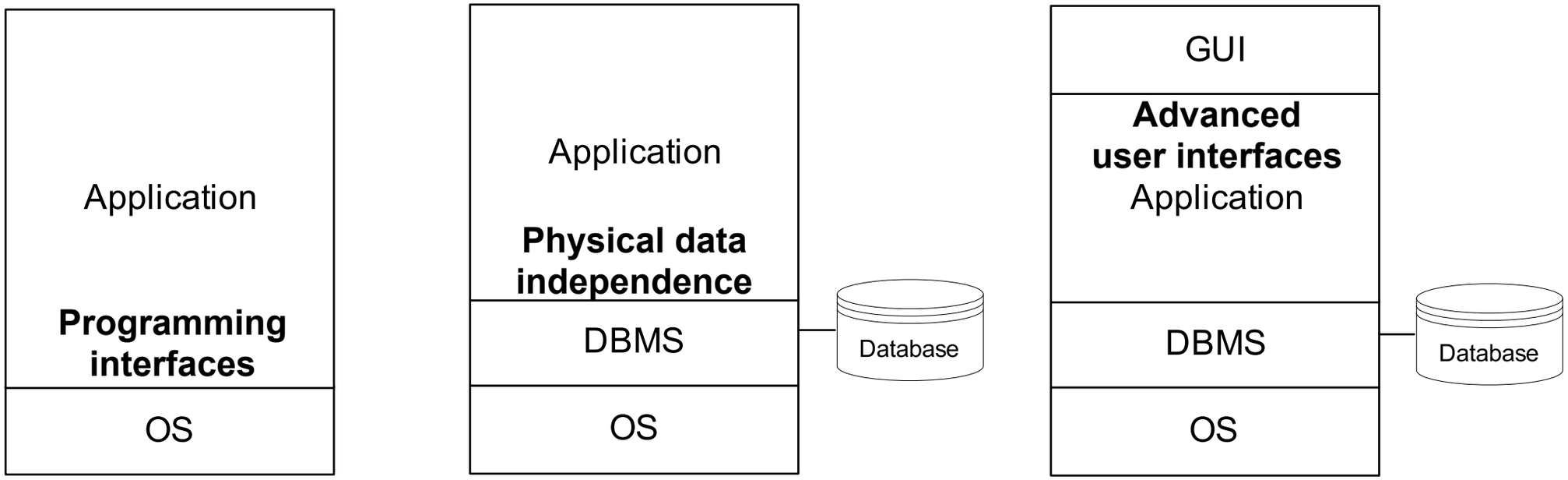
Definition: A **software architecture** defines a structure that organizes the software elements and the resources of a software system.

Gartner's hype cycle



A **hype cycle** is a (branded) graphic representation of the maturity, adoption and social application of specific technologies

Early (architectures)



Monolithic applications developed from scratch

Porting required redevelopment

Data dependency and consistency issues

Application code and (textual) user interfaces still entangled

Data management as a primary concern

Human interaction made easier

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Enterprise Applications

OS + DBMS + GUI + Networking capabilities =
more and more elaborate information systems
could be engineered

Typically hosting enterprise applications
(customers, personnel, products, resources)

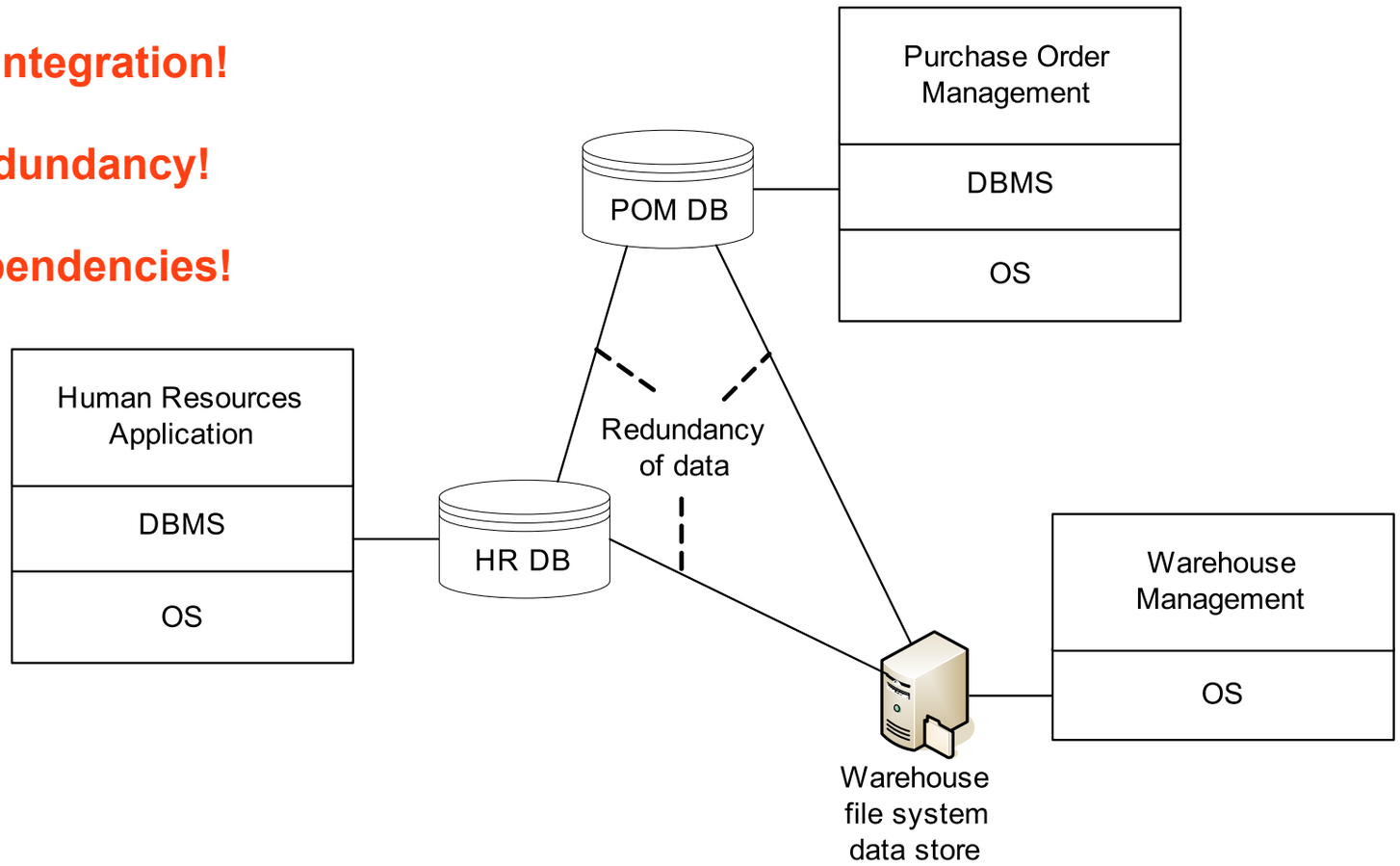
From individual to multiple information systems
(needs integration)

Individual enterprise application

Lack of Integration!

Data redundancy!

Data dependencies!



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Changes

Changes were hard to implement!

Hard to track data dependency and replication

Any modification of an application was a complex and error-prone activity, with domino effect
(e.g. change of customer address format)

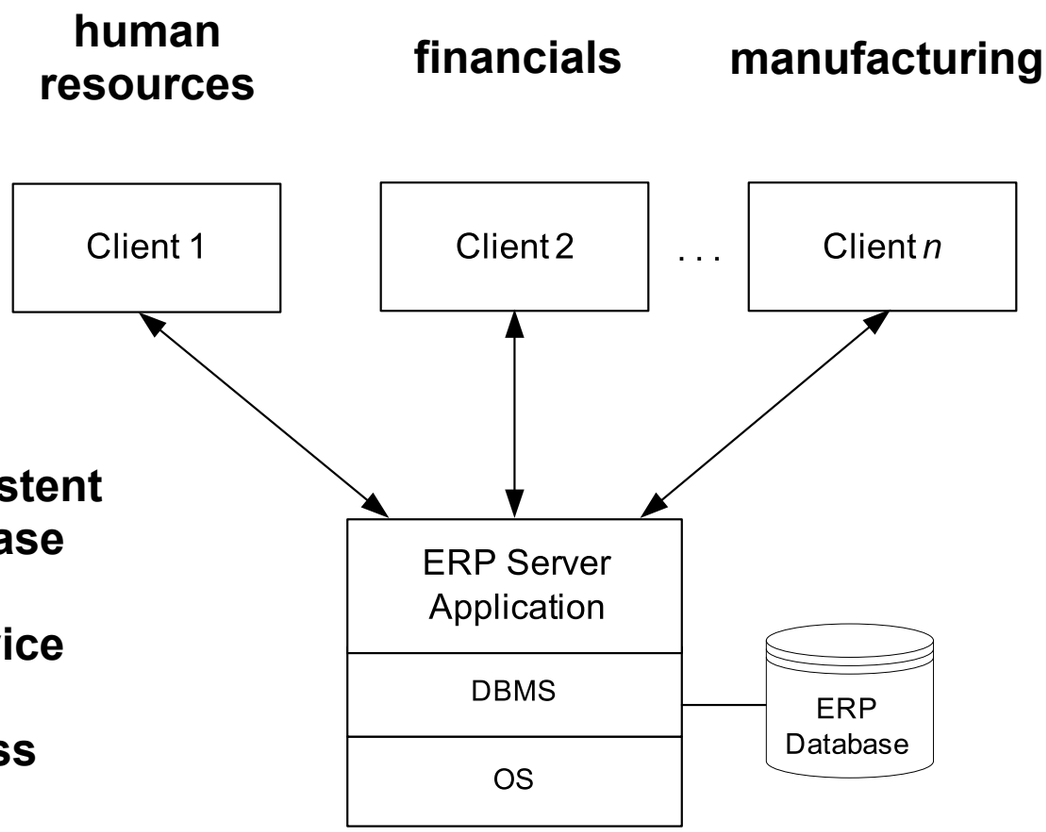
ERP

Enterprise Resource Planning (**ERP**) systems
to deal with the increasing complexity of changes

Basic idea

integrated database that spans most applications,
separated modules provide desired functionalities,
accessed by client applications

Enterprise resource planning systems



Integrated and consistent (centralized) database

Two-tier client-service

remote data access

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ERP

CRM and SCM

New types of sw entered the market around 2000

Customer Relationship Management (**CRM**) systems
Supply Chain Management (**SCM**) systems

Goal

to support the planning, operation, and control of supply chains, including inventory management, warehouse management, management of suppliers and distributors, and demand planning

Problem: different vendors, separately developed

Siloed enterprise applications

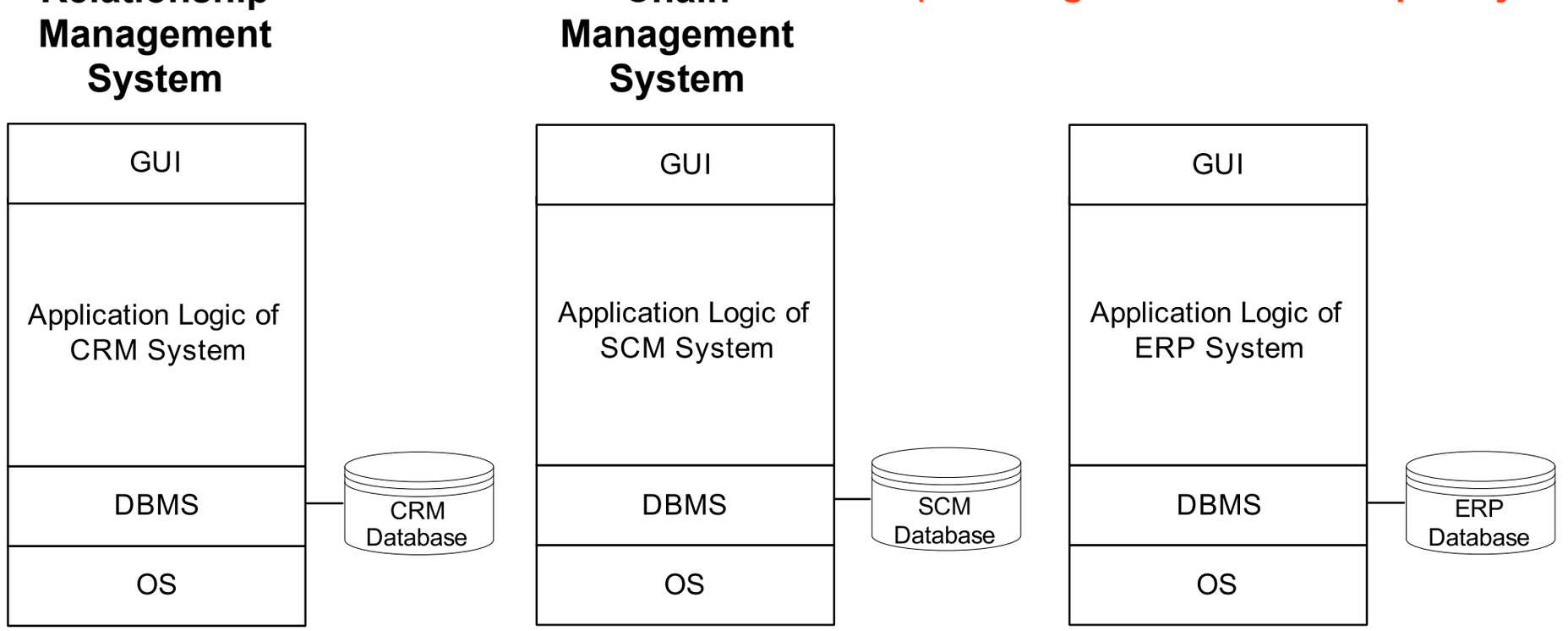
Lack of Integration!

Data redundancy!

Data dependencies!

Data Integration would provide valuable information

(on a larger scale and complexity than before)



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Connected on local network, but not logically integrated

Enterprise Application Integration

Definition: **Enterprise Application Integration** (**EAI**) is defined as the use of software and computer systems architectural principles to integrate a set of enterprise computer applications.

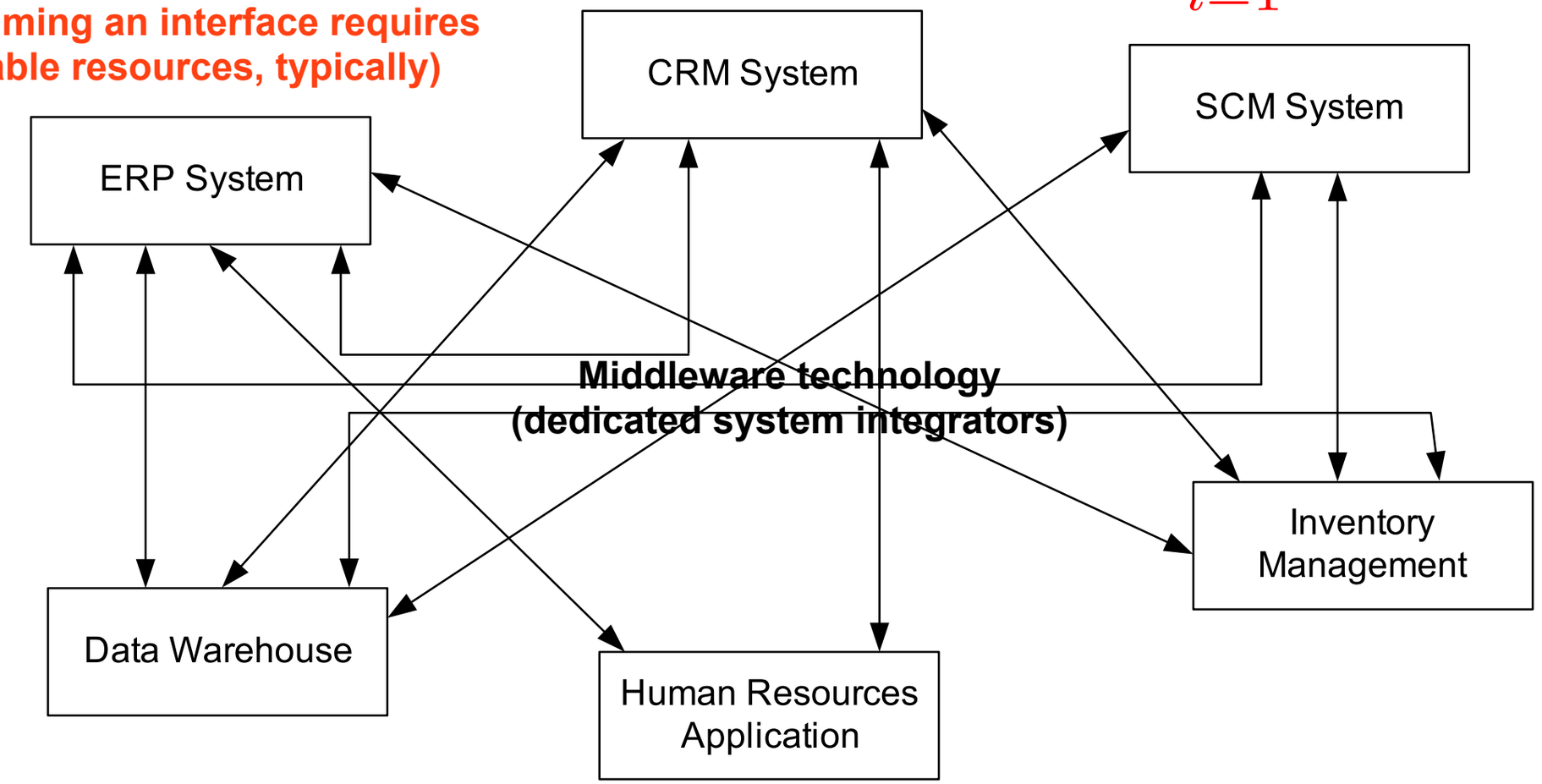
Point-to-point integration (of silos)

N x N hard-wiring problem!

Too many interfaces to develop!

Does not respond well to changes! (Reprogramming an interface requires considerable resources, typically)

$$\sum_{i=1}^{N-1} i = \frac{N(N-1)}{2}$$



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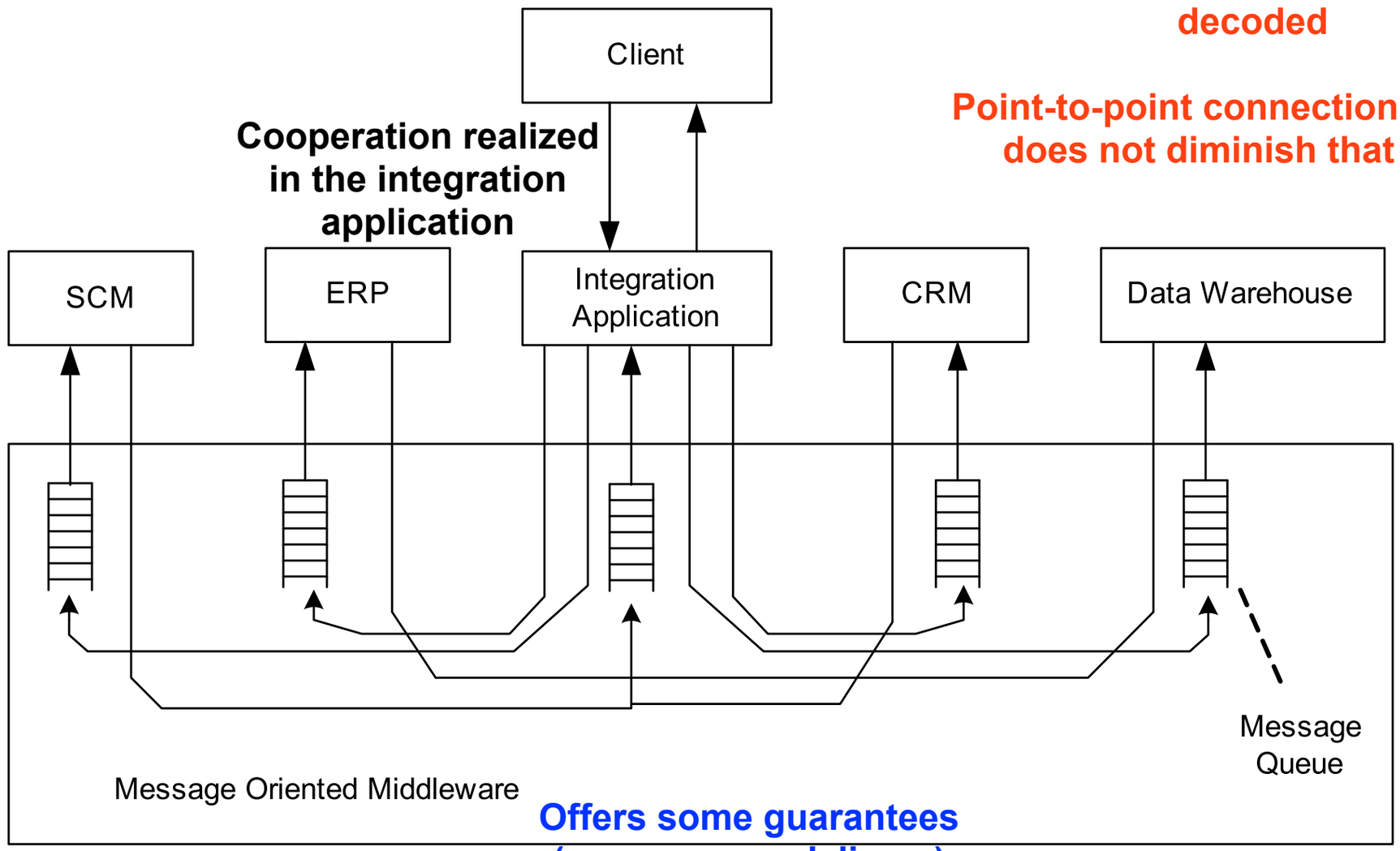
Message-oriented middleware



Messages must be encoded and decoded

Point-to-point connection problem does not diminish that much

Offers some guarantees (e.g message delivery)

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Hub-and-Spoke

The **Hub-and-Spoke** paradigm is based on a central hub and a number of spokes attached to it

The Application Integration middleware represents the hub, and the applications to be integrated represents the spokes

Interactions between any two applications must pass through the hub

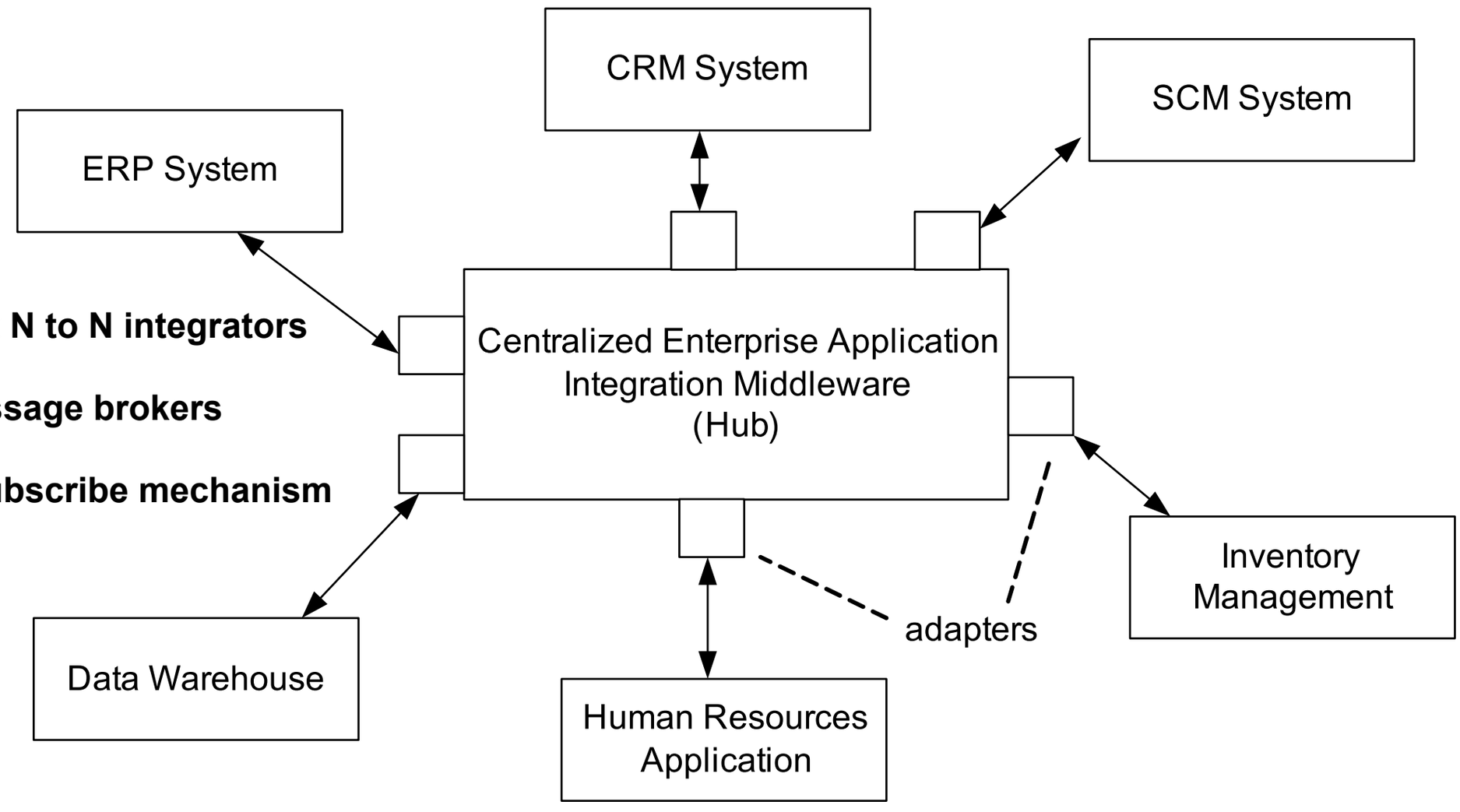
Hub-and-spoke integration

Configuration and management of adapters and message brokers can become cumbersome

From N x N to N integrators

Message brokers

Publish/subscribe mechanism



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EAI implementation pitfalls

70% of all EAI projects fail (2003).
Most of these failures are not due to technical difficulties, but due to management issues:

Constant change

Shortage of EAI experts

Competing standards

Loss of detail: Information unimportant at an earlier stage may become crucial later

Data protectionism

From (data-models and)
data-integration

To (process-models and)
process-integration

Value Chains and Process Orientation

Two major factors fuelled business process management

Value chains

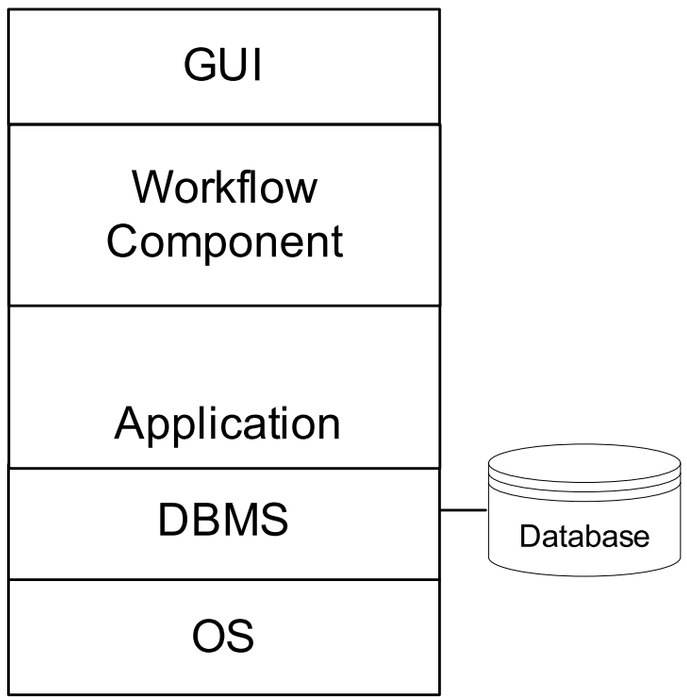
as a means to functionally break down the activities a company performs

Process orientation

as the way to organize the activities of enterprises

Workflow component

Definition: a **single-application workflow** consists of activities and their causal and temporal ordering that are realized by one common application system.



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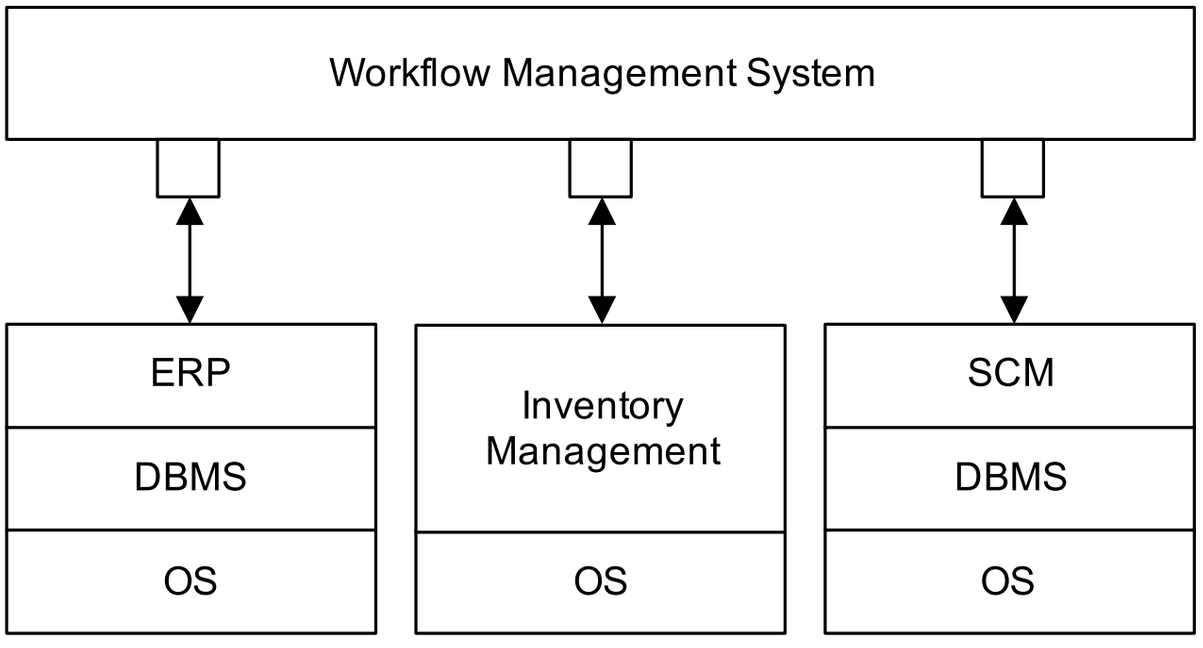
Multiple-application workflow system

Definition: a **multiple-application workflow** contains activities that are realized by multiple application systems, providing an integration of these systems.



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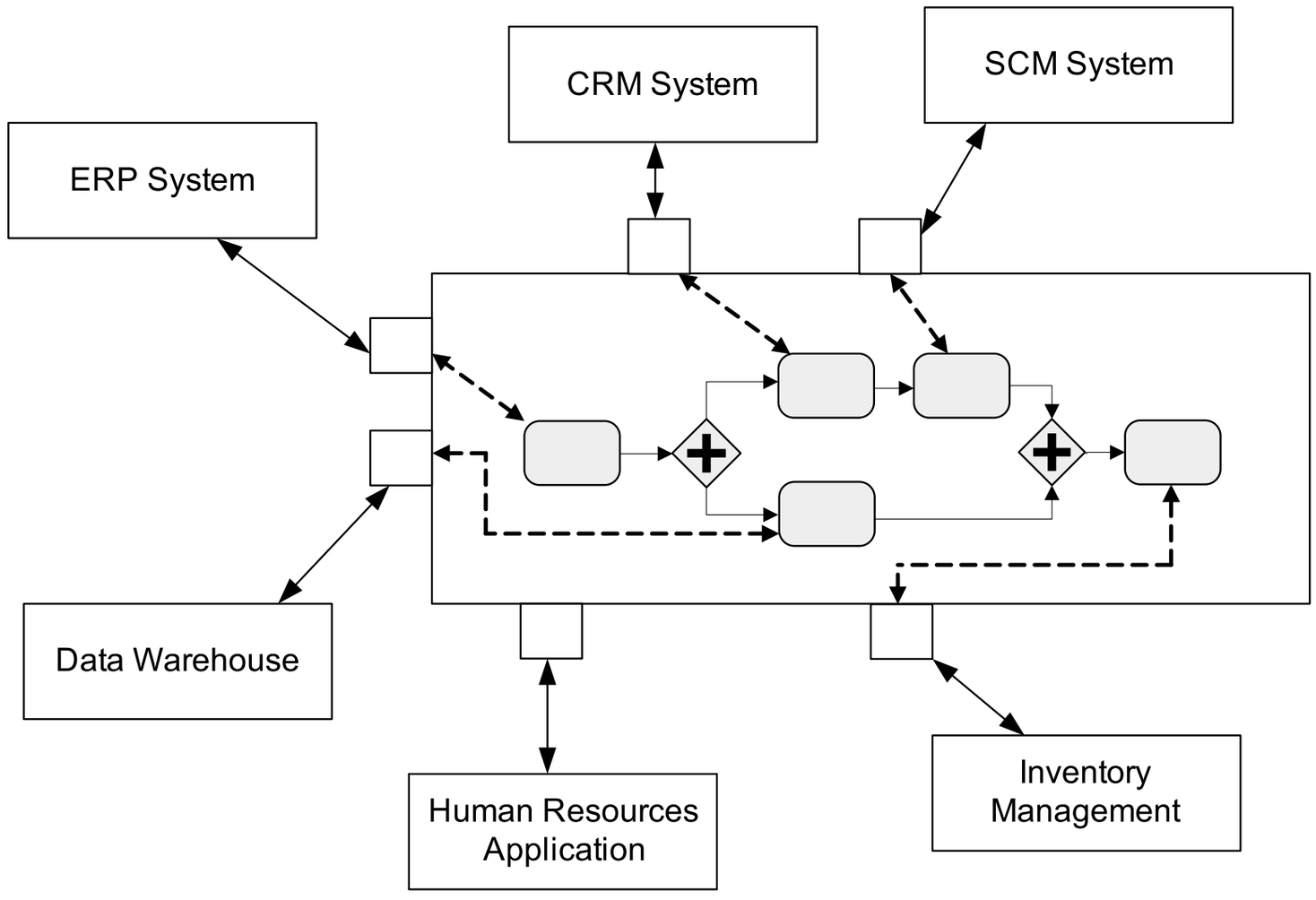
System workflow

Definition: a **system workflow** consists of activities that are implemented by software systems without any user involvement.



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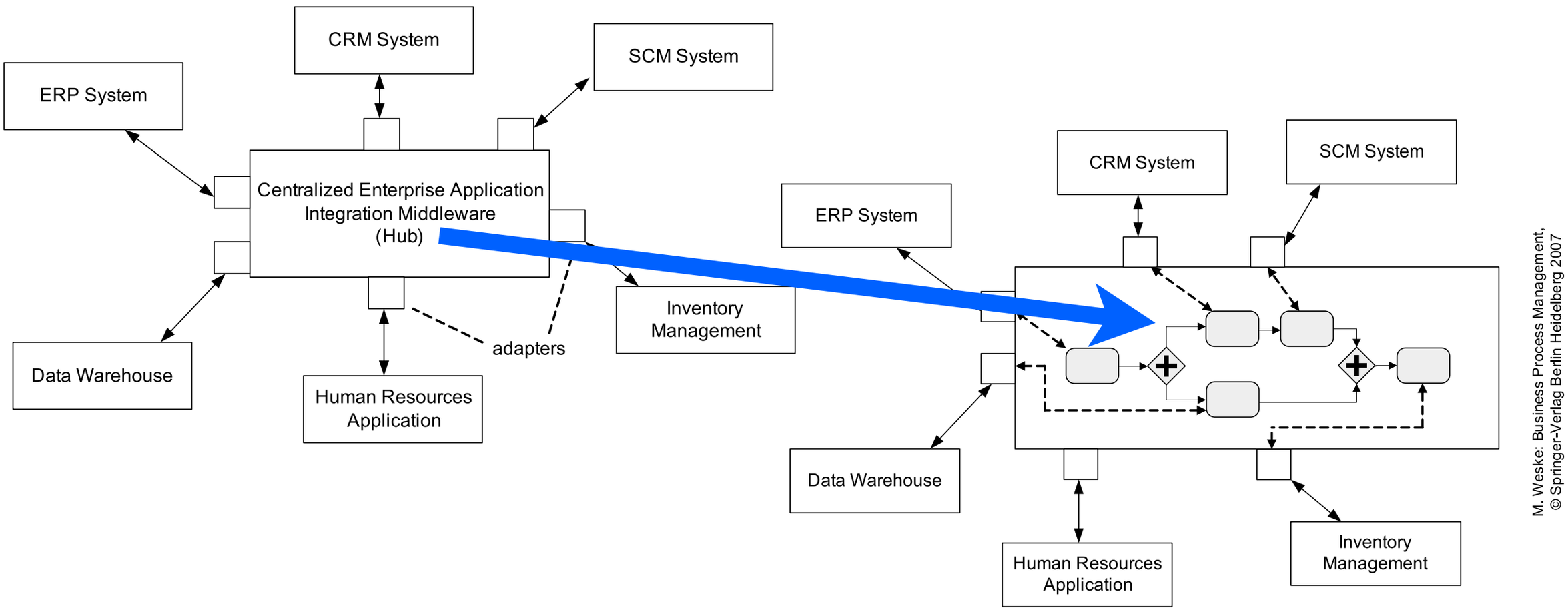
Workflows fit well with hub-and-spokes EAI



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Limitations in workflow management

Technical integration problems:

Scarcely documented applications

Different levels of granularity

Tight coupling of applications
(direct invocation)

Enterprise service computing

Main idea:

Business functionalities exposed as services

Services are equipped with usage information

Customers can find services and use them

Services

Definition: **Services** are loosely-coupled computing tasks that can be dynamically **discovered** and **invoked** over the network.

Each service comes with a **service description** that can be published in **service registries** by the **service provider**.

Service registries can be **queried** by **service requestors**.

Service descriptions provide a level of detail that facilitates service requestors to **bind** and **invoke** them.

Service-oriented architectures

Definition: **Service-oriented architectures** (**SOA**) are software architectures that provide an environment for describing and finding software services, and for binding to services.

Service-oriented architectures

Service Requestor

Service Provider

Service Registry

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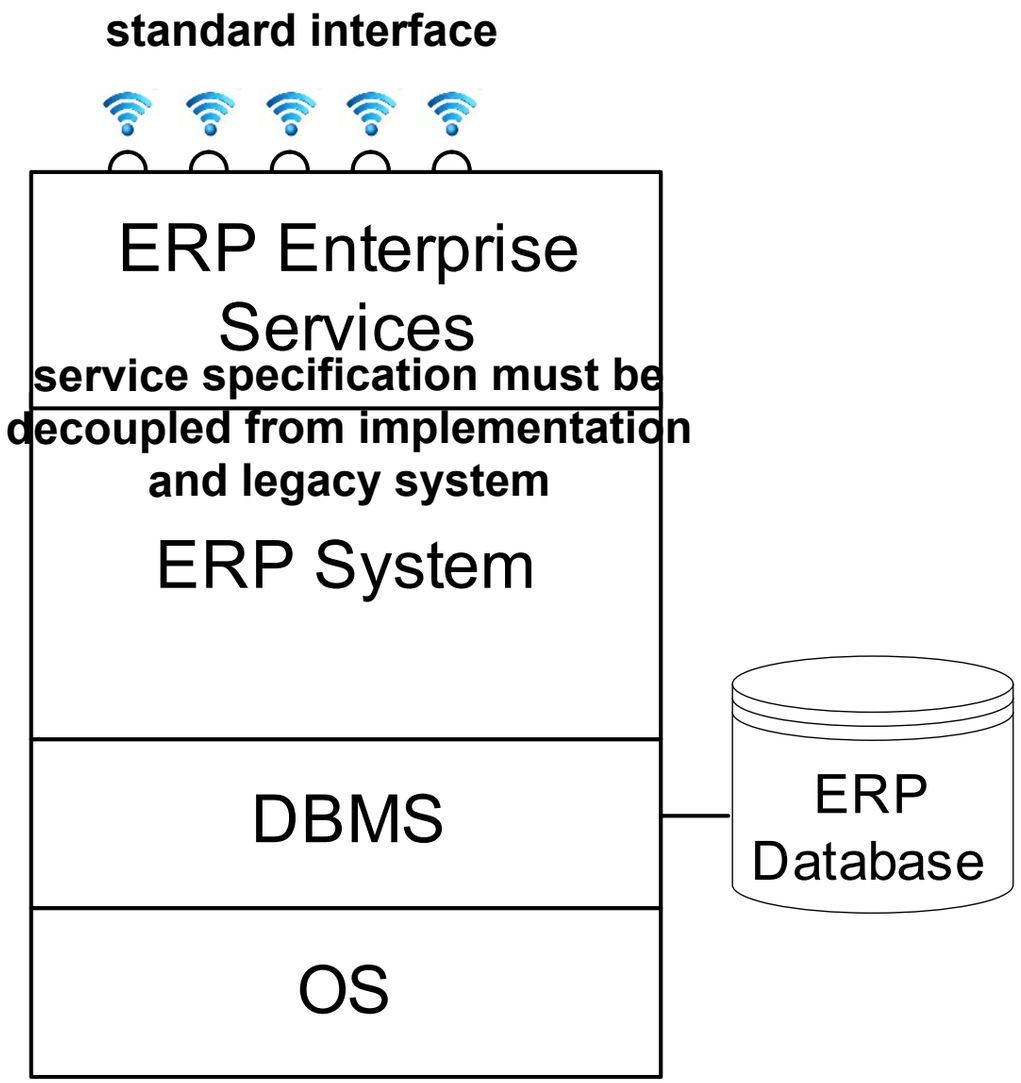
Service enabled application system



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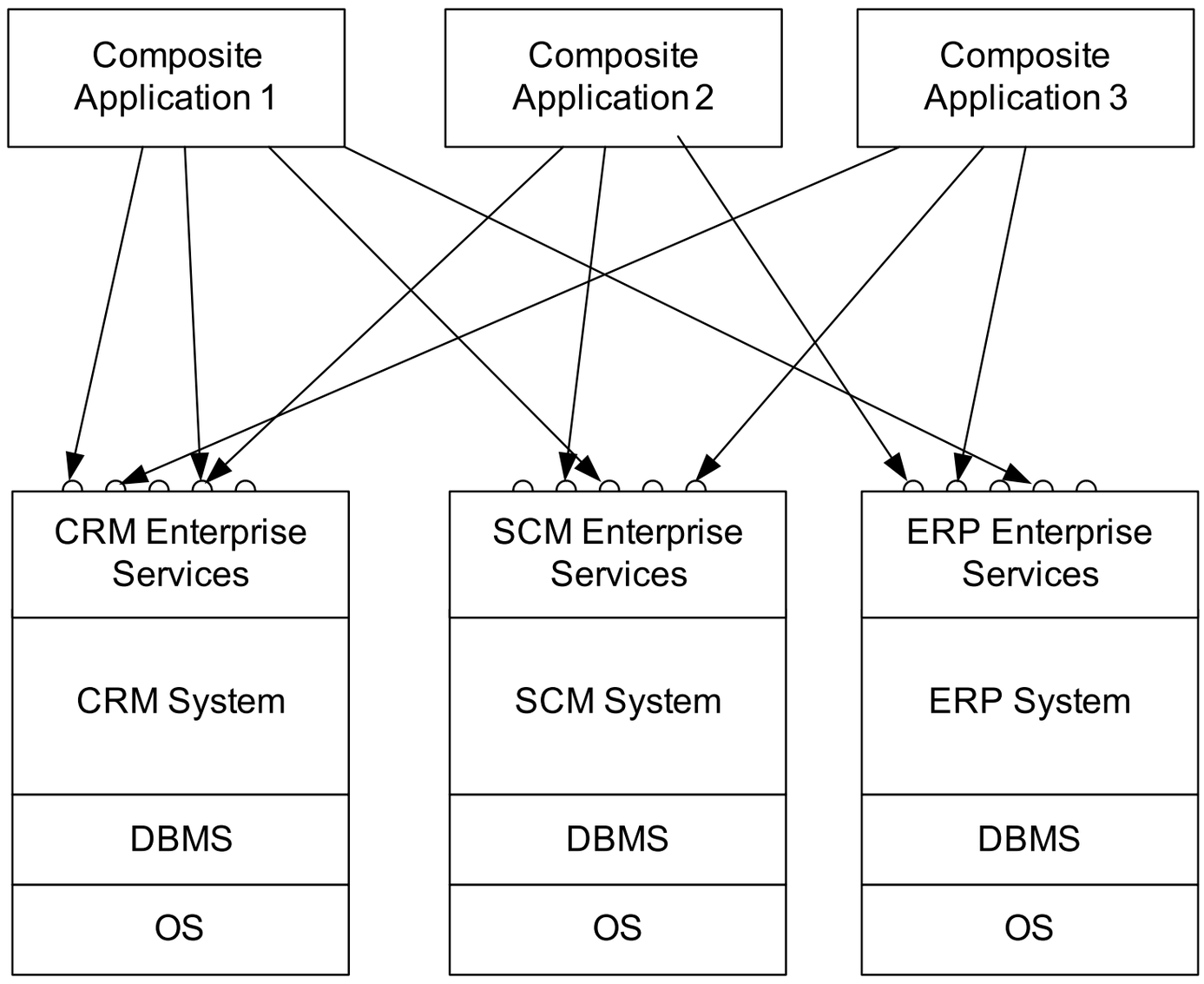
Composite service based application

Intra-company

well-expressed as business processes



Local registry

Manual search (absence of dynamic matchmaking)

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Advantages of SOA

Reuse of functionality at coarse level of granularity

New applications can be built with less effort

Existing applications can be efficiently adapted to changing requirements

Reduced maintenance and development costs

Products as services

Corporations are increasingly perceived by the set of services they provide

These services exposed to the market can be realized by enterprise services (provided by the back-end application system)

Also services provided by third parties can be integrated so that better end used services can be provided to the customer

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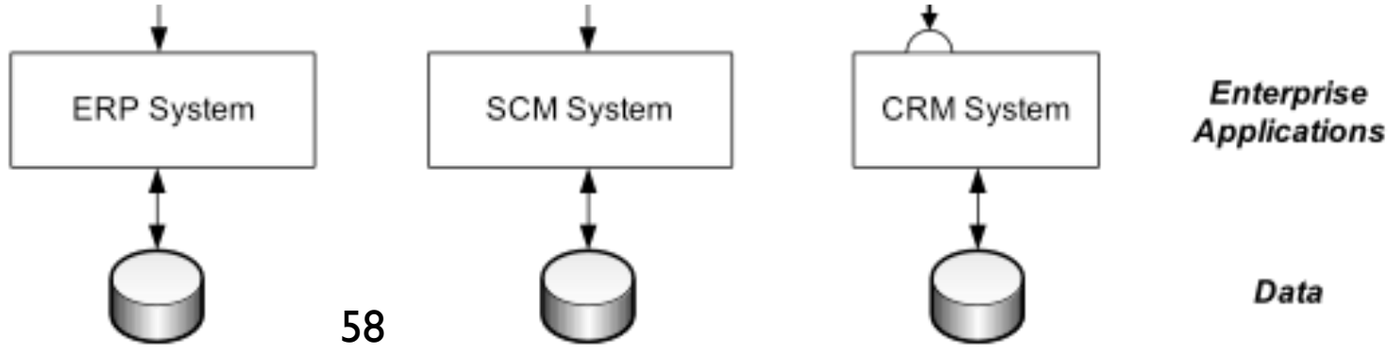

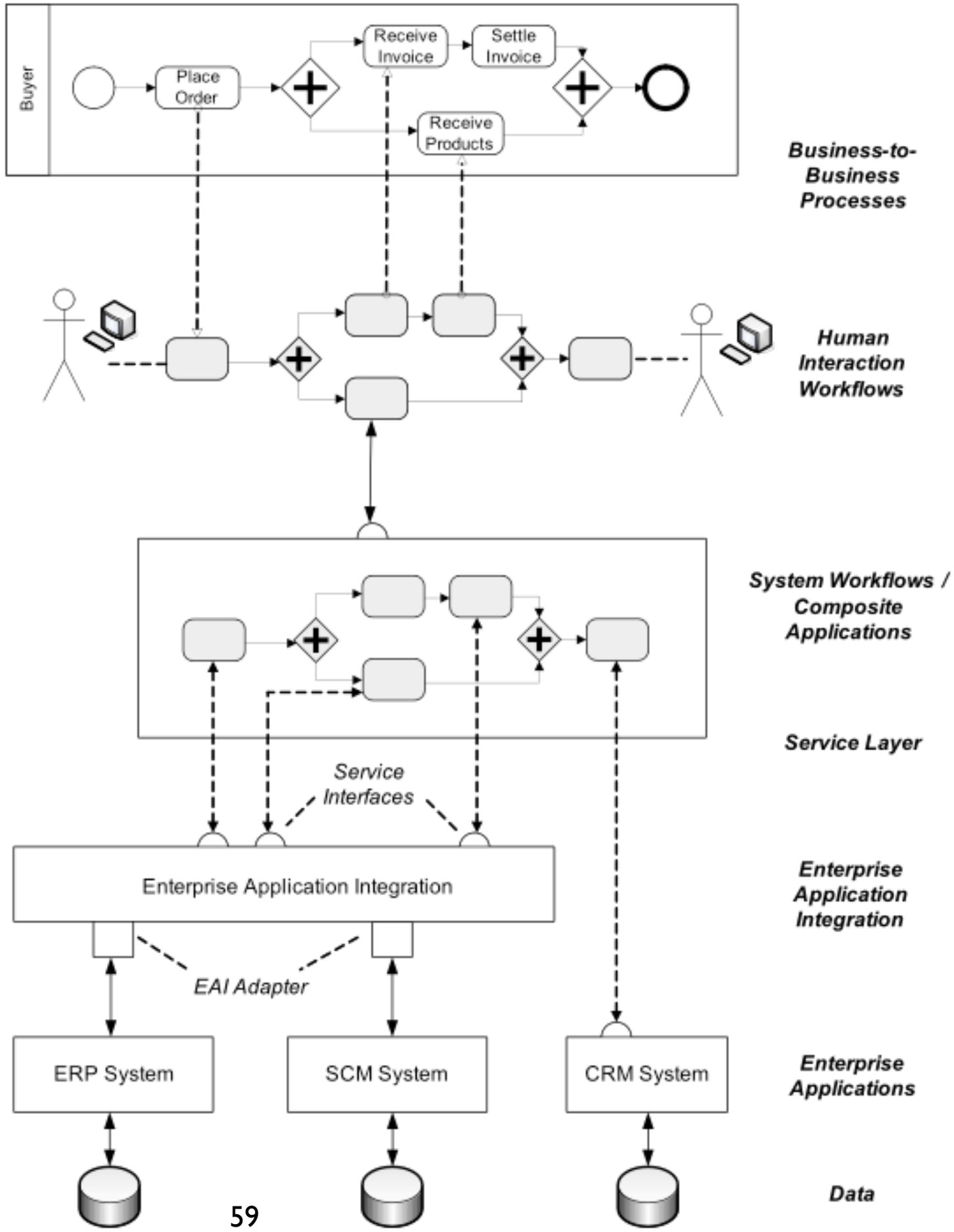

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