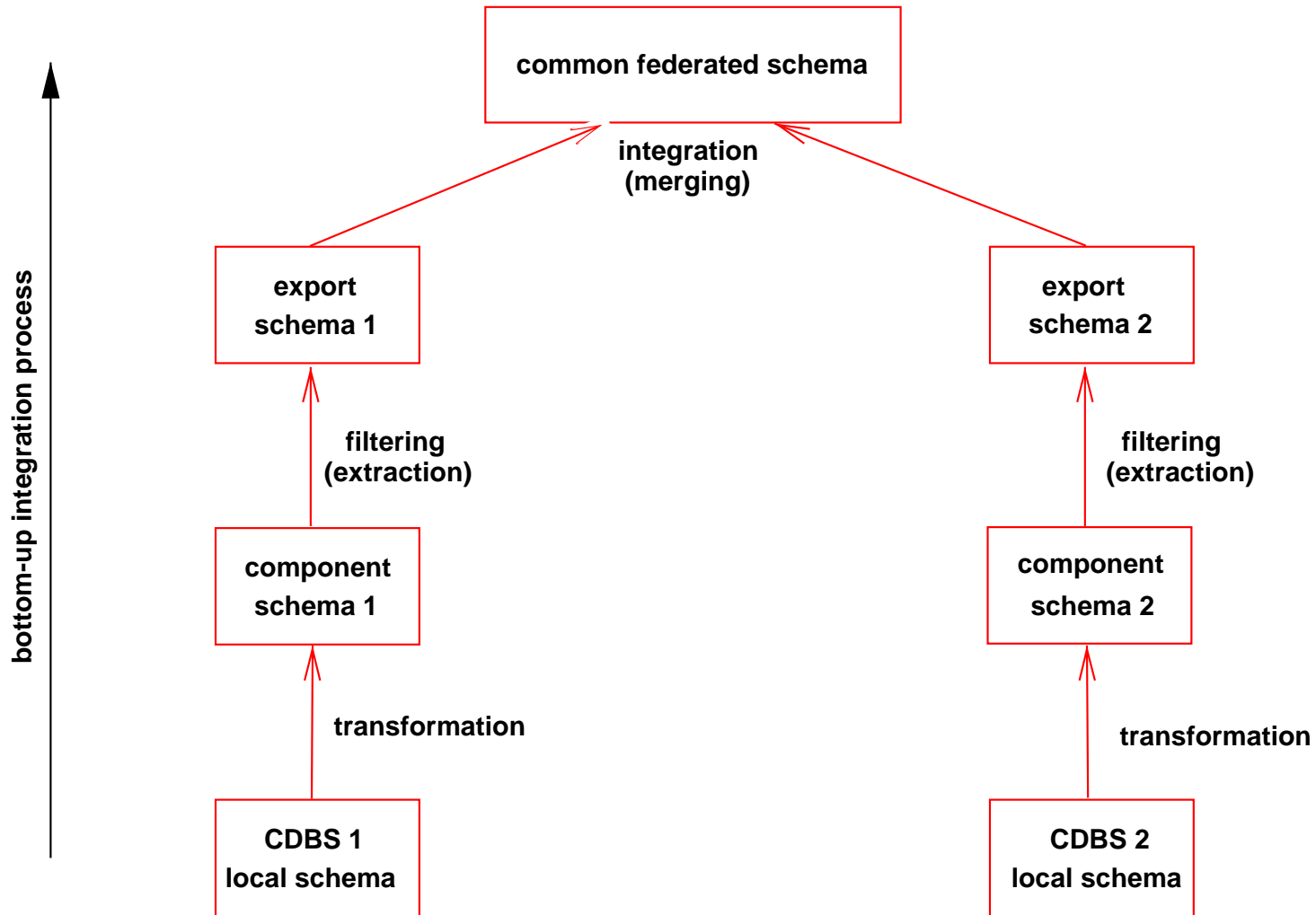# On The Process of Systems Integration

Wilhelm (Willi) Hasselbring
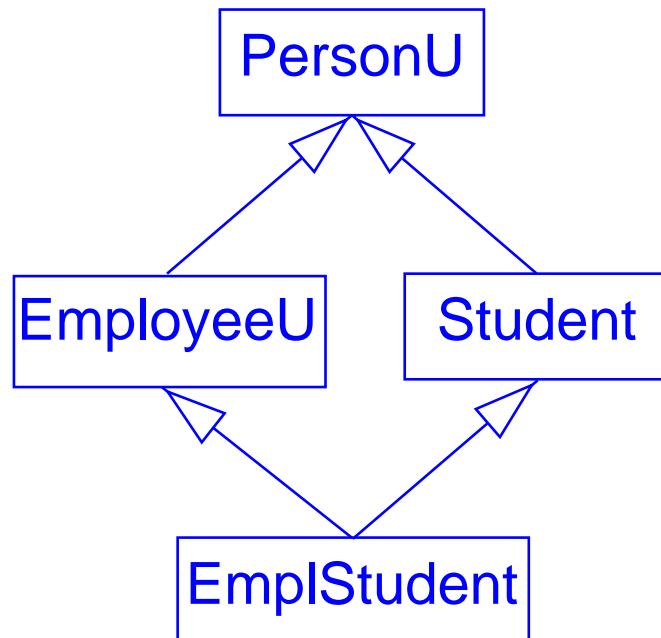Infolab, Tilburg University

Viewpoints:

- Traditional bottom-up integration

- Top-down integration

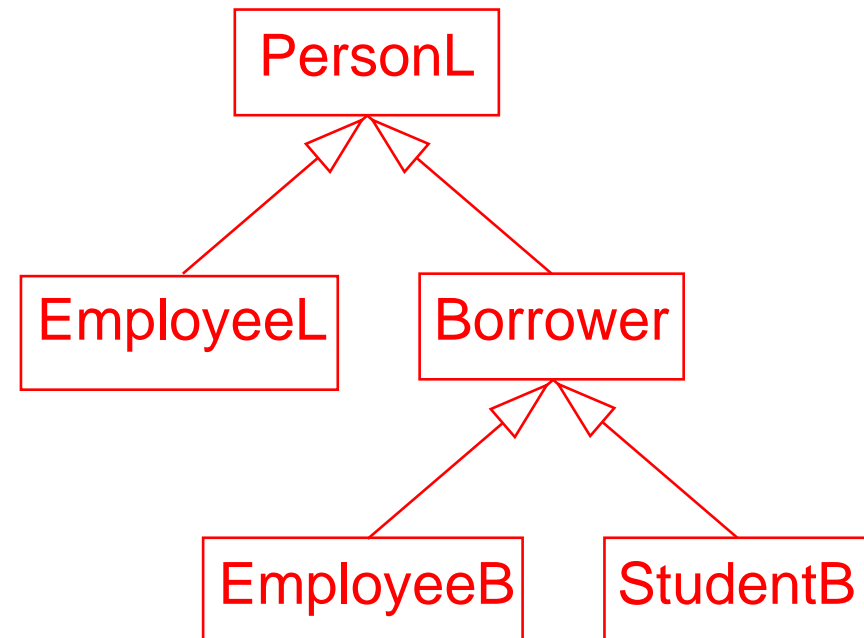- Combined yo-yo approach

Traditional Bottom-Up Integration

# Example: Two Local Schemas

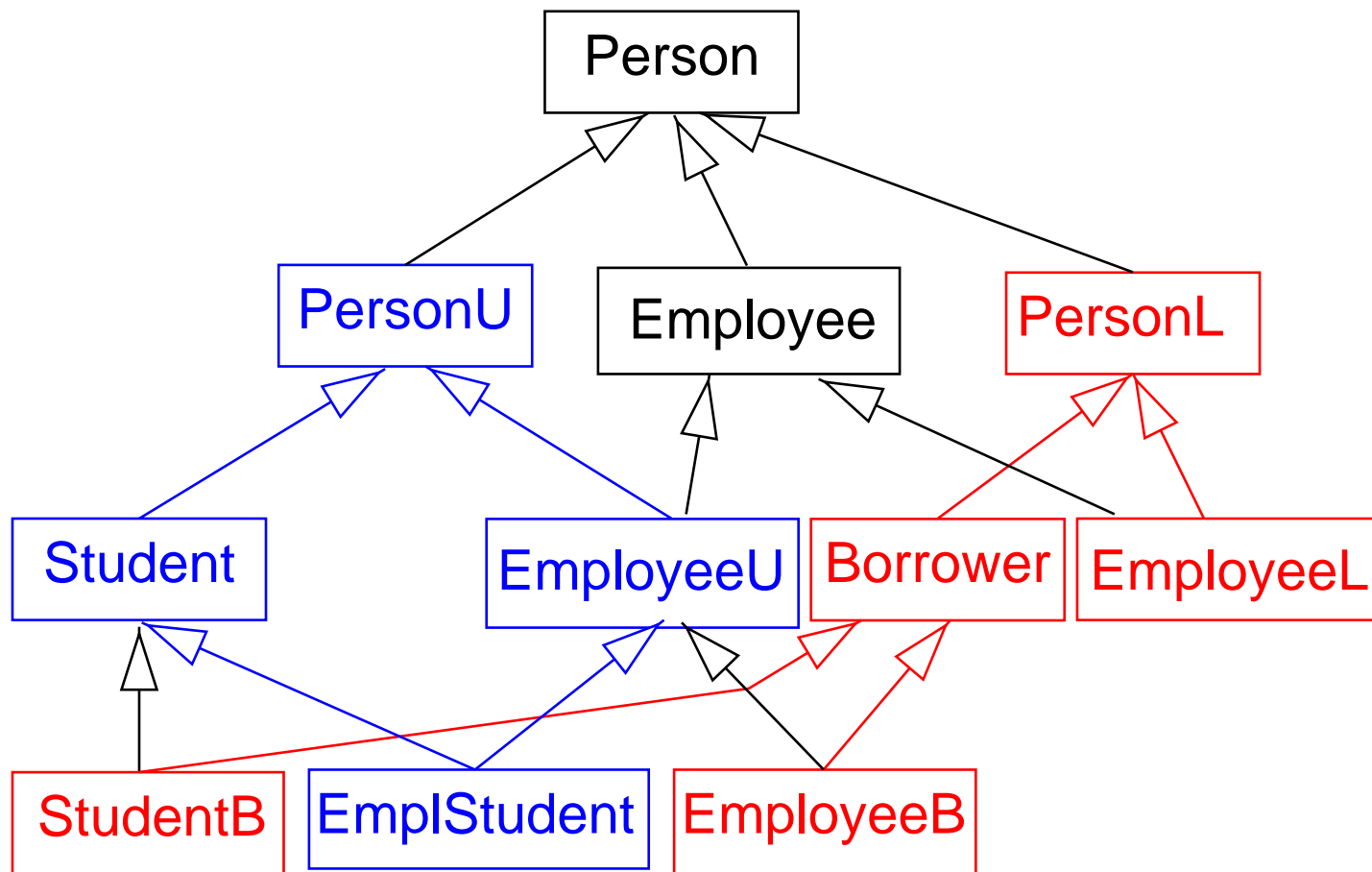University   Library

```
        PersonU                                      PersonL

  EmployeeU     Student                        EmployeeL     Borrower

        EmplStudent                                  EmployeeB     StudentB
```

Assumptions: PersonU and PersonL do overlap; EmployeeB and StudentB are subsets of EmployeeU and Student, respectively.
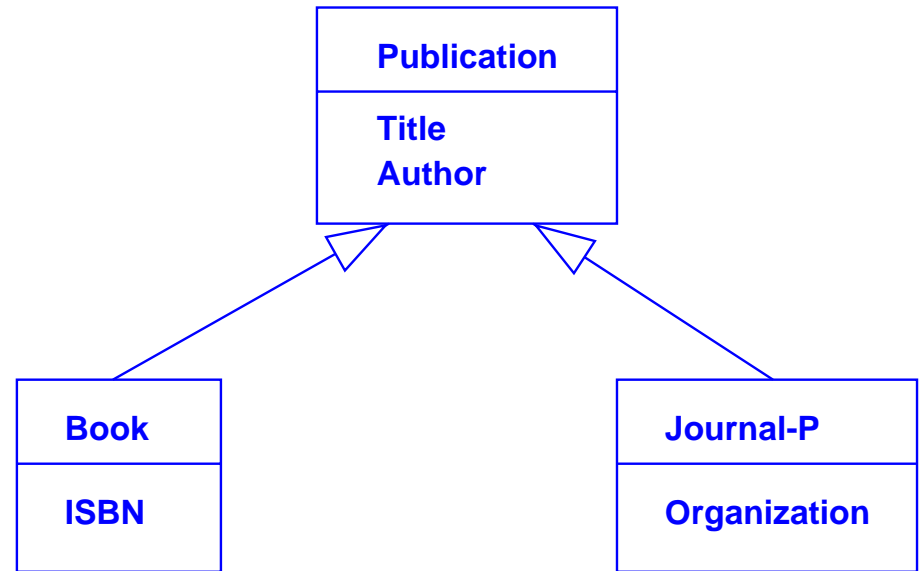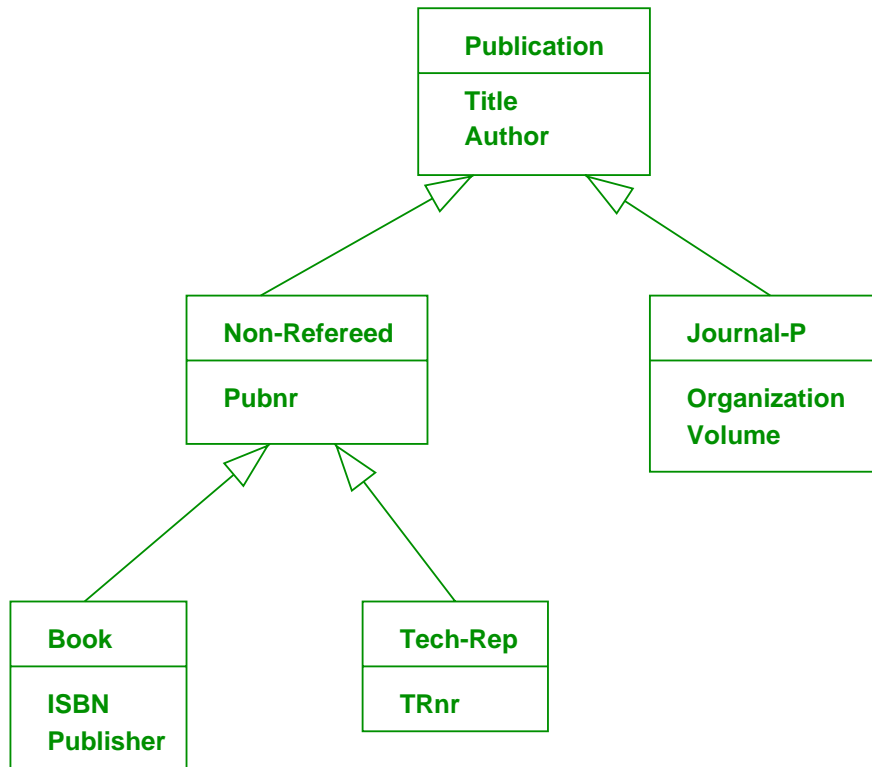Example adopted from Stefan Conrad: "Föderierte Datenbanksysteme", Springer, 1997.

Integration with the "Upward Inheritance Principle"
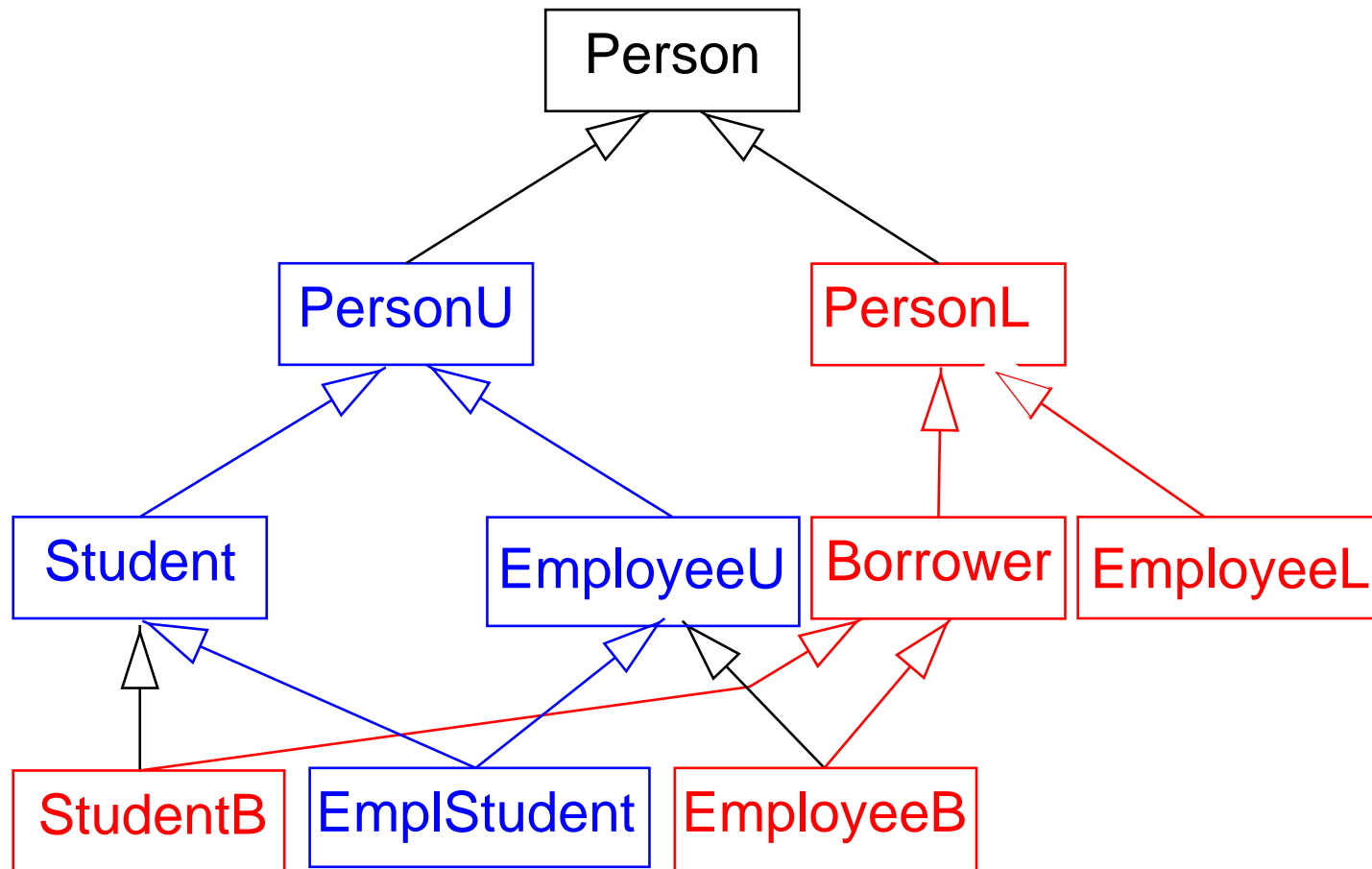
Additional Assumption: Employees of the library are employees of the university
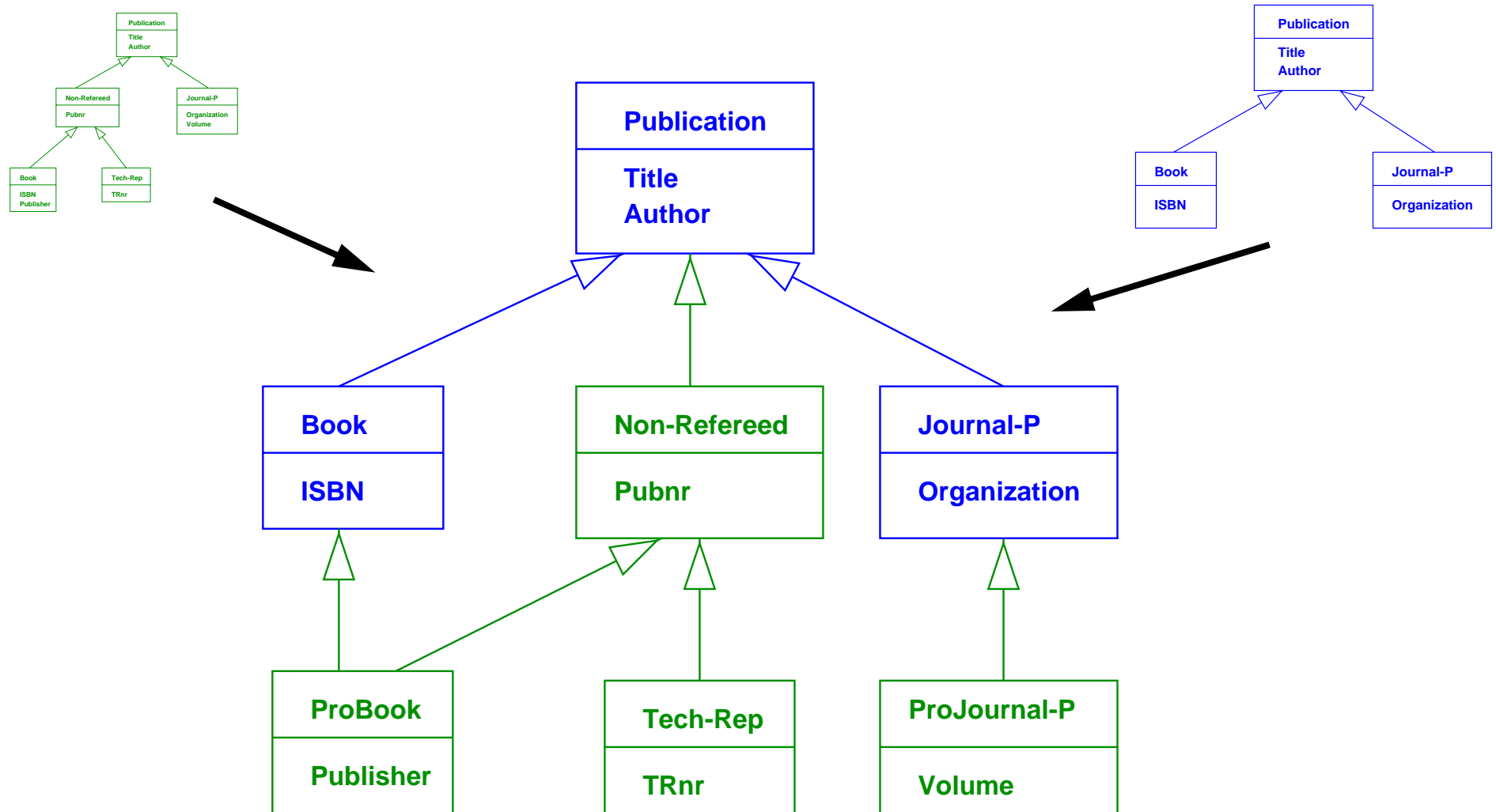
Another Example

```
        ┌─────────────────┐
        │  Publication    │
        ├─────────────────┤
        │  Title          │
        │  Author         │
        └─────────────────┘
```

Publication

Title
Author

Non-Refereed

Pubnr

Journal-P

Organization
Volume

Book

ISBN
Publisher

Tech-Rep

TRnr

Publication

Title
Author

Book

ISBN

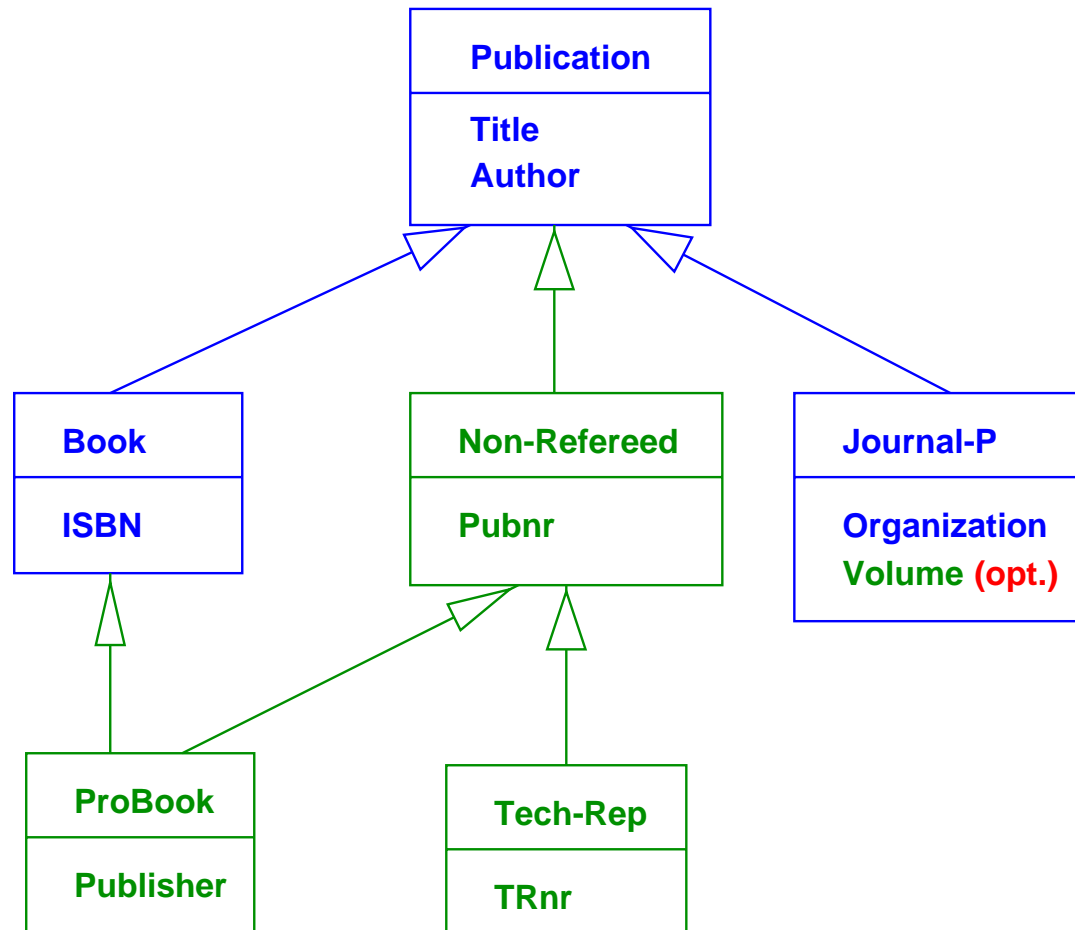**Journal-P**

Organization

Adopted from:
Schmitt & Saake: "Merging Inheritance Hierarchies for Database Integration", CoopIS'98
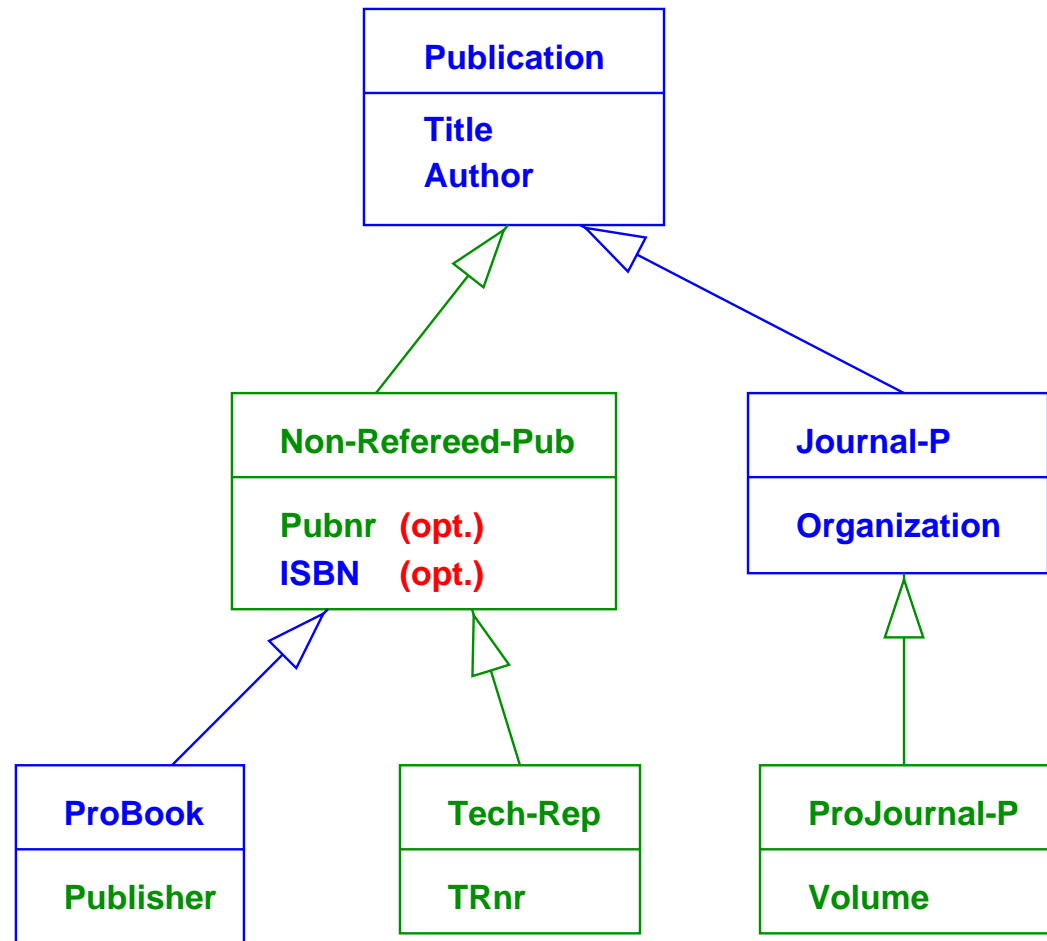
Initial Result of the Integration

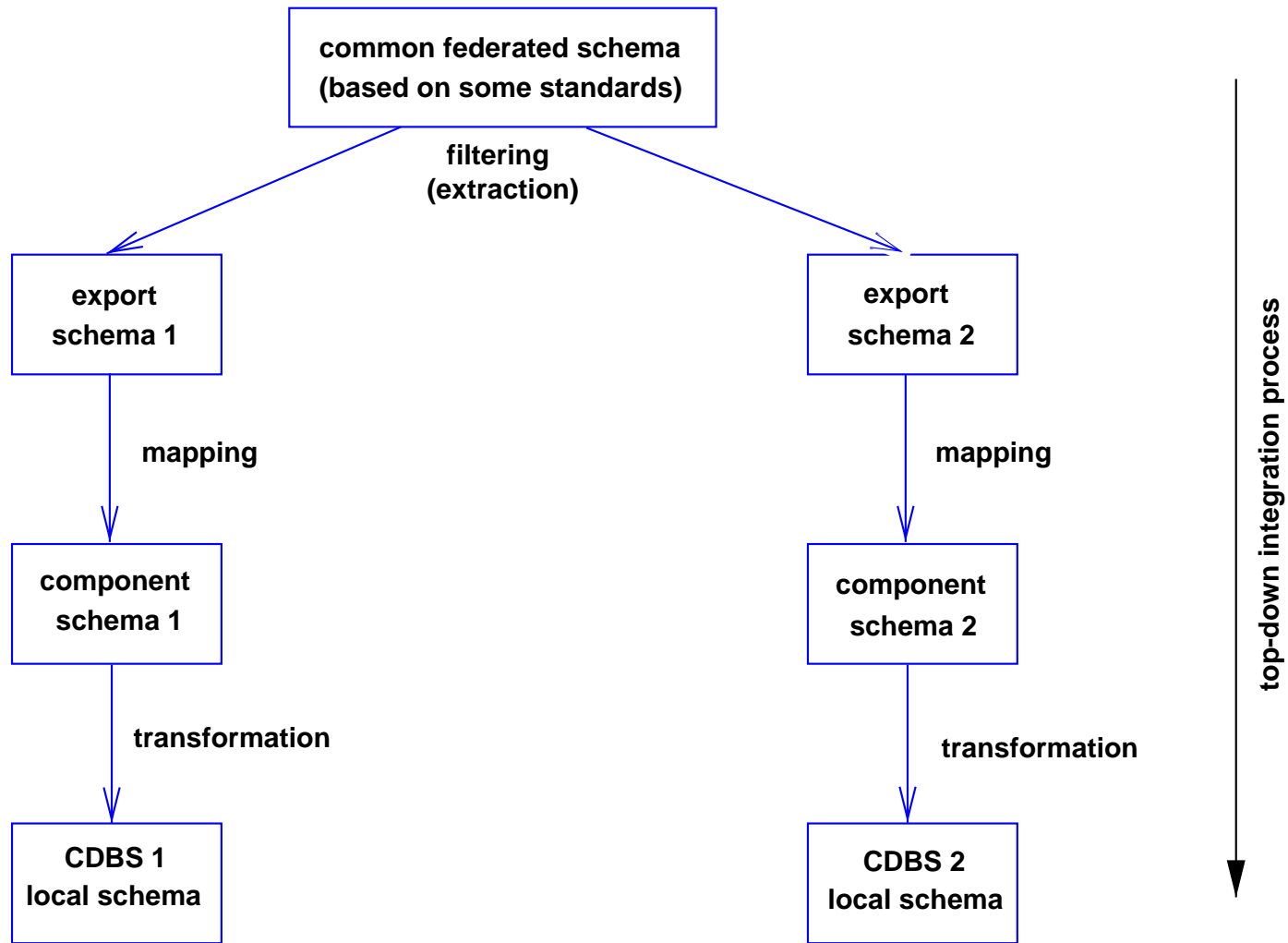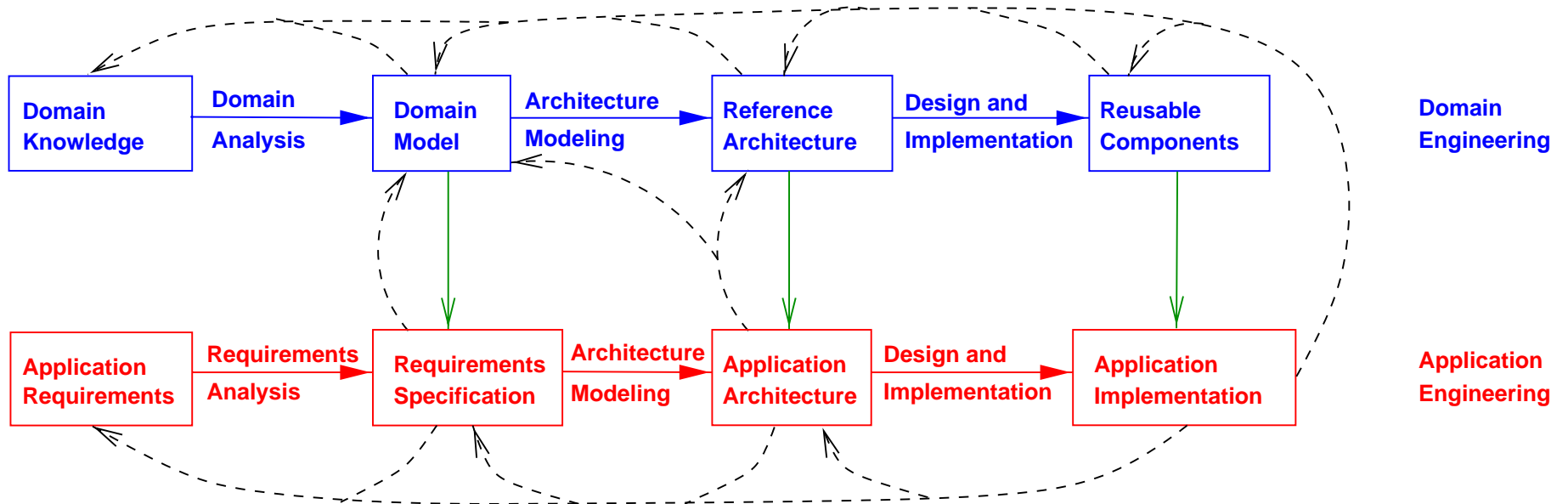# Minimizing the number of classes through vertical merging

Minimizing the number of classes through horizontal merging
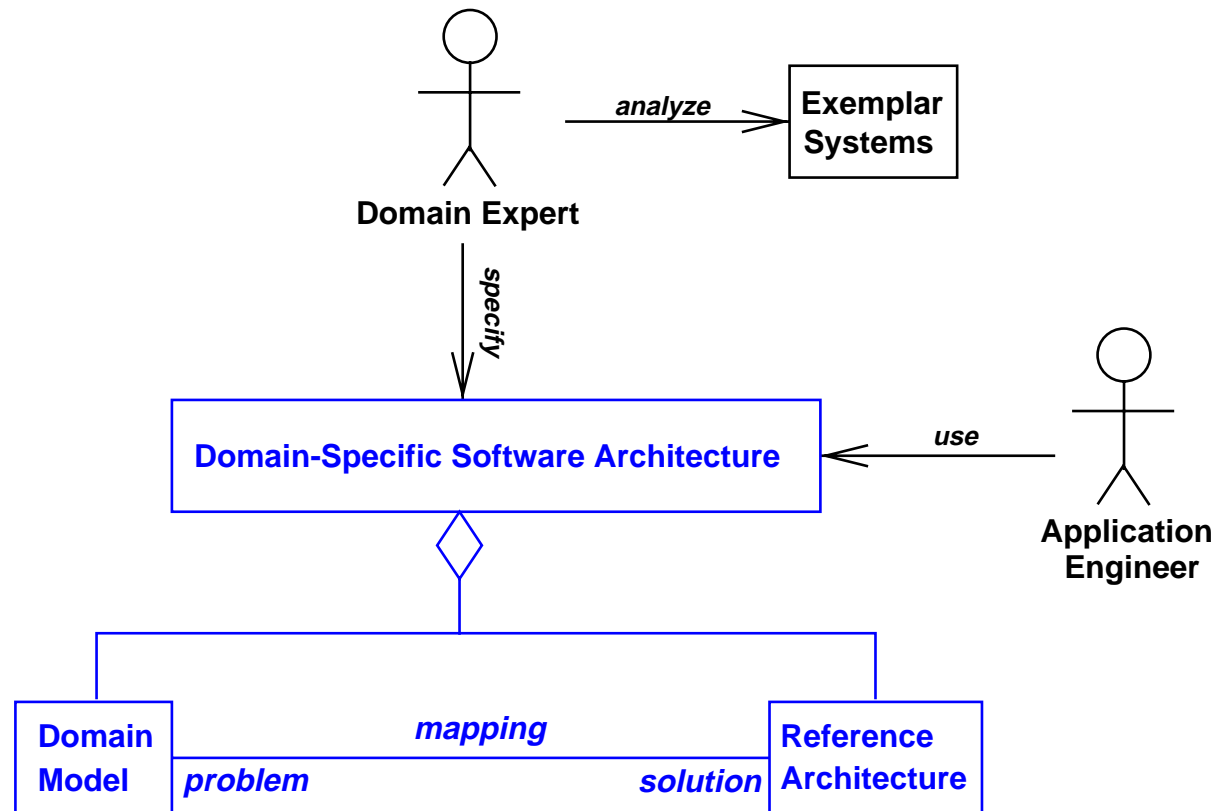
Top-Down Integration as an Alternative

Domain-Specific Software Architecture Development Process
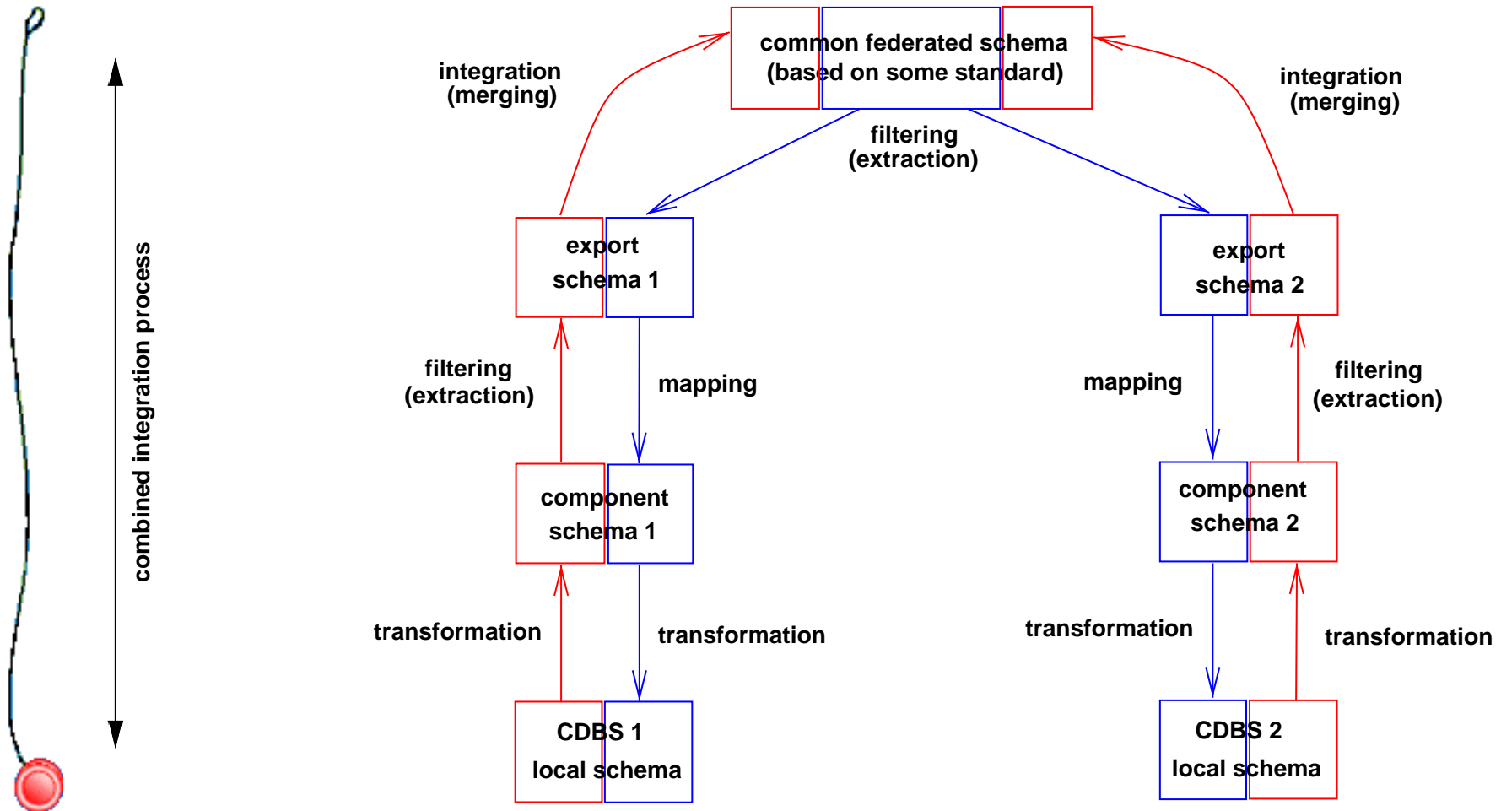

Emphasis on separation of

- Domain Engineering and

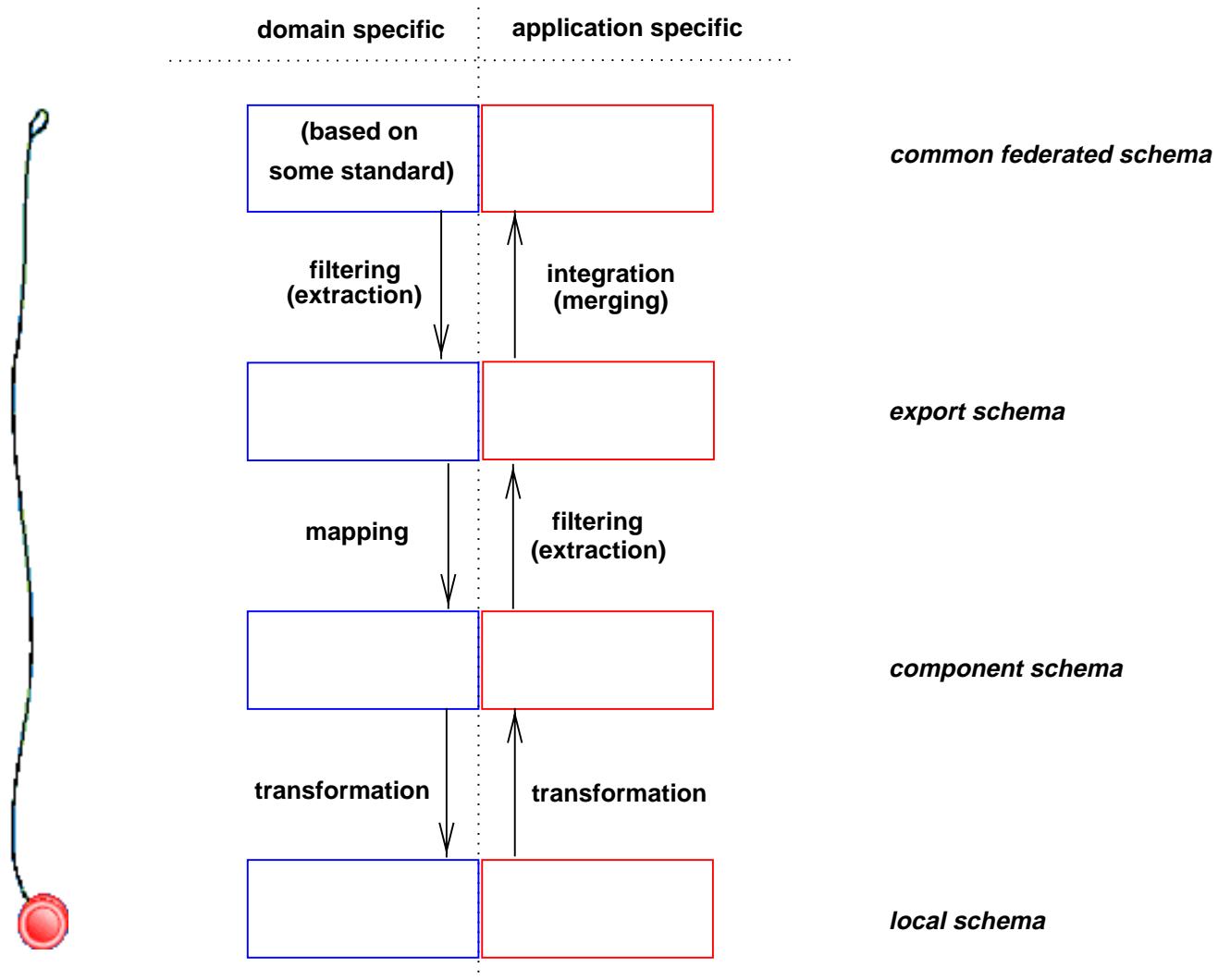- Application Engineering.

Artifacts and Roles

Domain models should be based on domain-specific standards.

Combined Yo-Yo Approach

Domain/Application Engineering and FDBS

domain specific | application specific

(based on some standard) — common federated schema

filtering (extraction) / integration (merging)

— export schema

mapping / filtering (extraction)

— component schema

transformation / transformation

— local schema

Domain Facilitators & Mediators
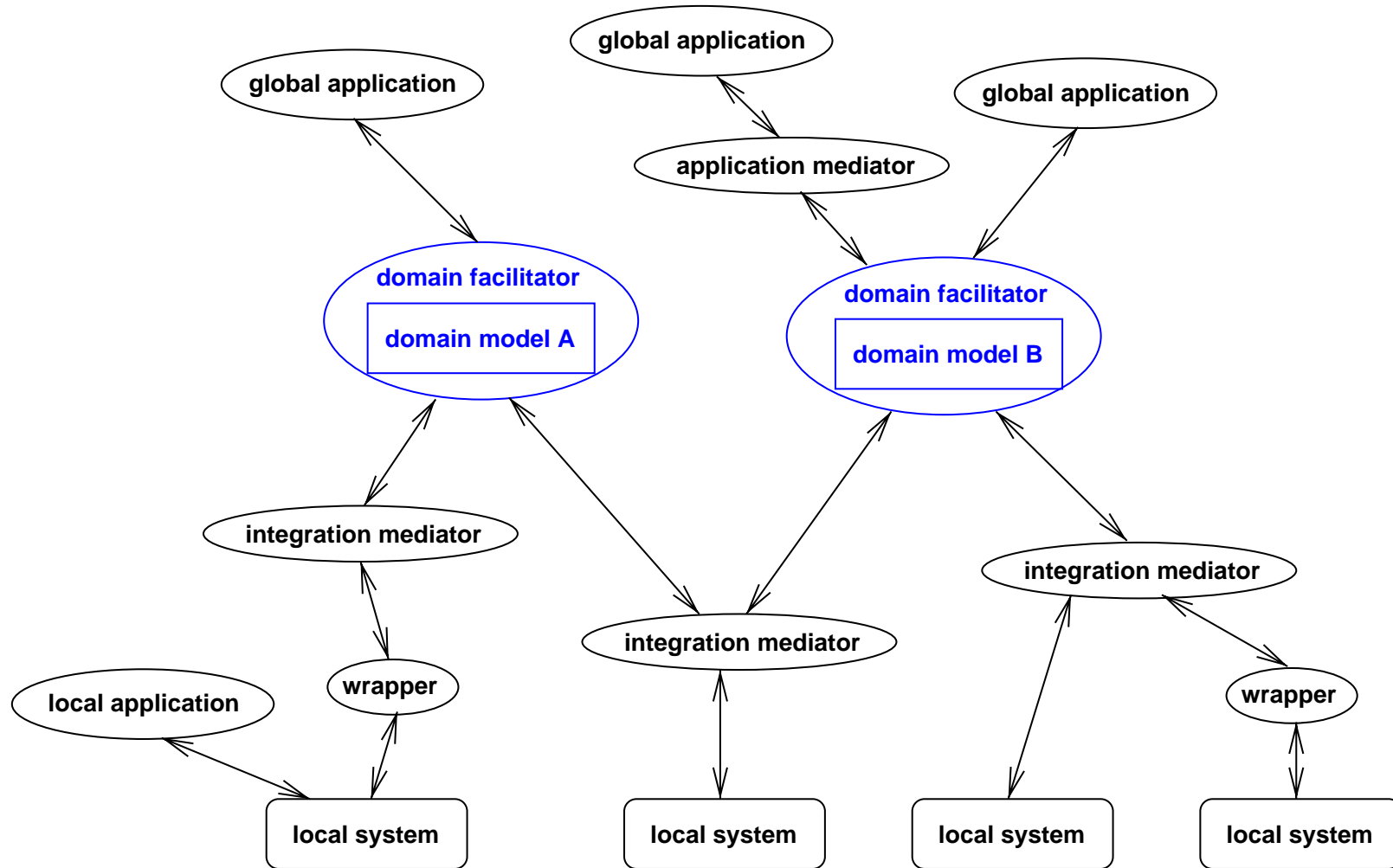
Summary

Jim Kleewein at VLDB '96:

> ``Schema integration is one aspect of usability that impedes federation.
> There are often thousands of tables or views involved in a federation making
> maintenance of a global schema difficult.''

Basing the global schema on standards-based domain models should avoid changes to the fundamental structure of this schema, making integration more usable and scalable.

Approach:

- Shifting the responsibility for the integration from the multidatabase level towards the local level.

- The integration mediators have to do more, the domain facilitators do less.

Any comments?