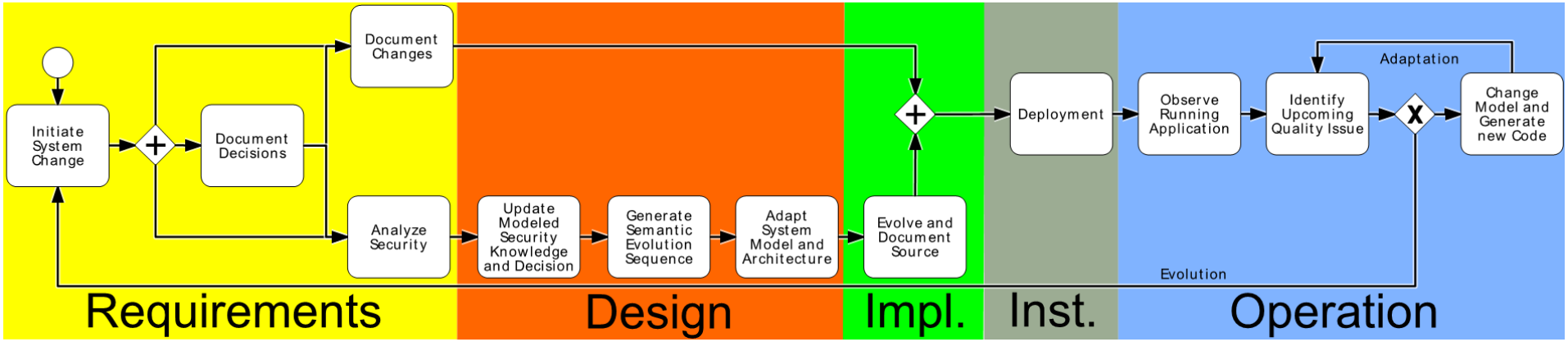
iObserve

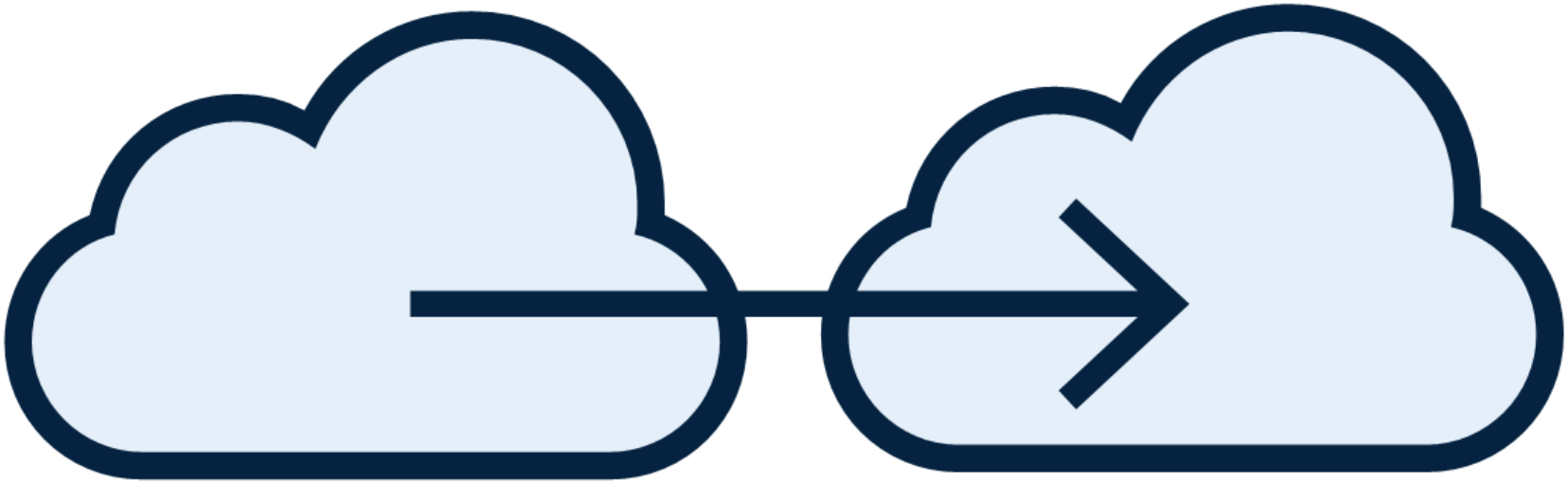
Integrated Observation and Modeling Techniques to Support Adaptation and Evolution of Software Systems

Robert Heinrich, Reiner Jung, Eric Schmieder,
Andreas Metzger, Wilhelm Hasselbring,
Klaus Pohl, Ralf Reussner



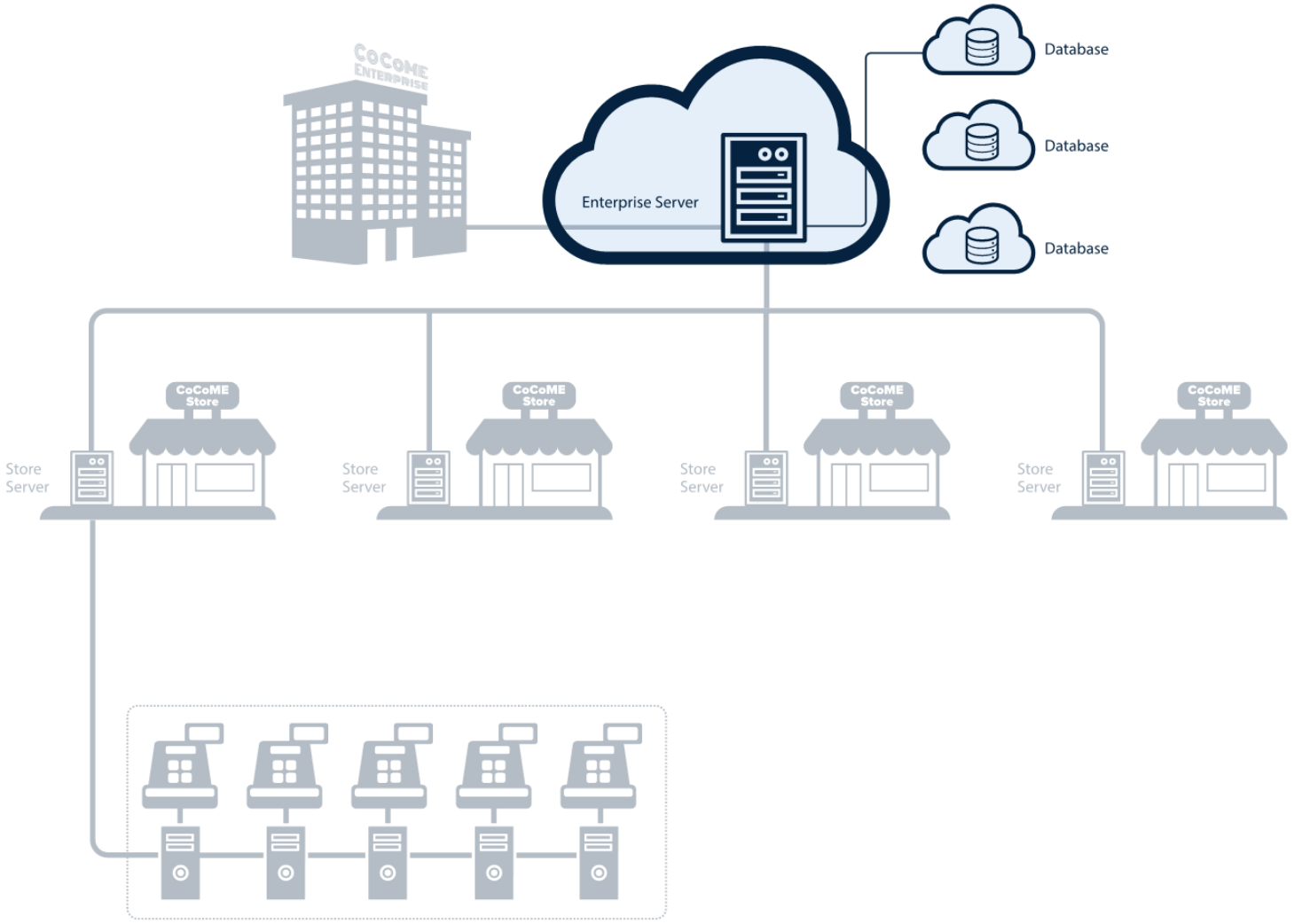
iObserve

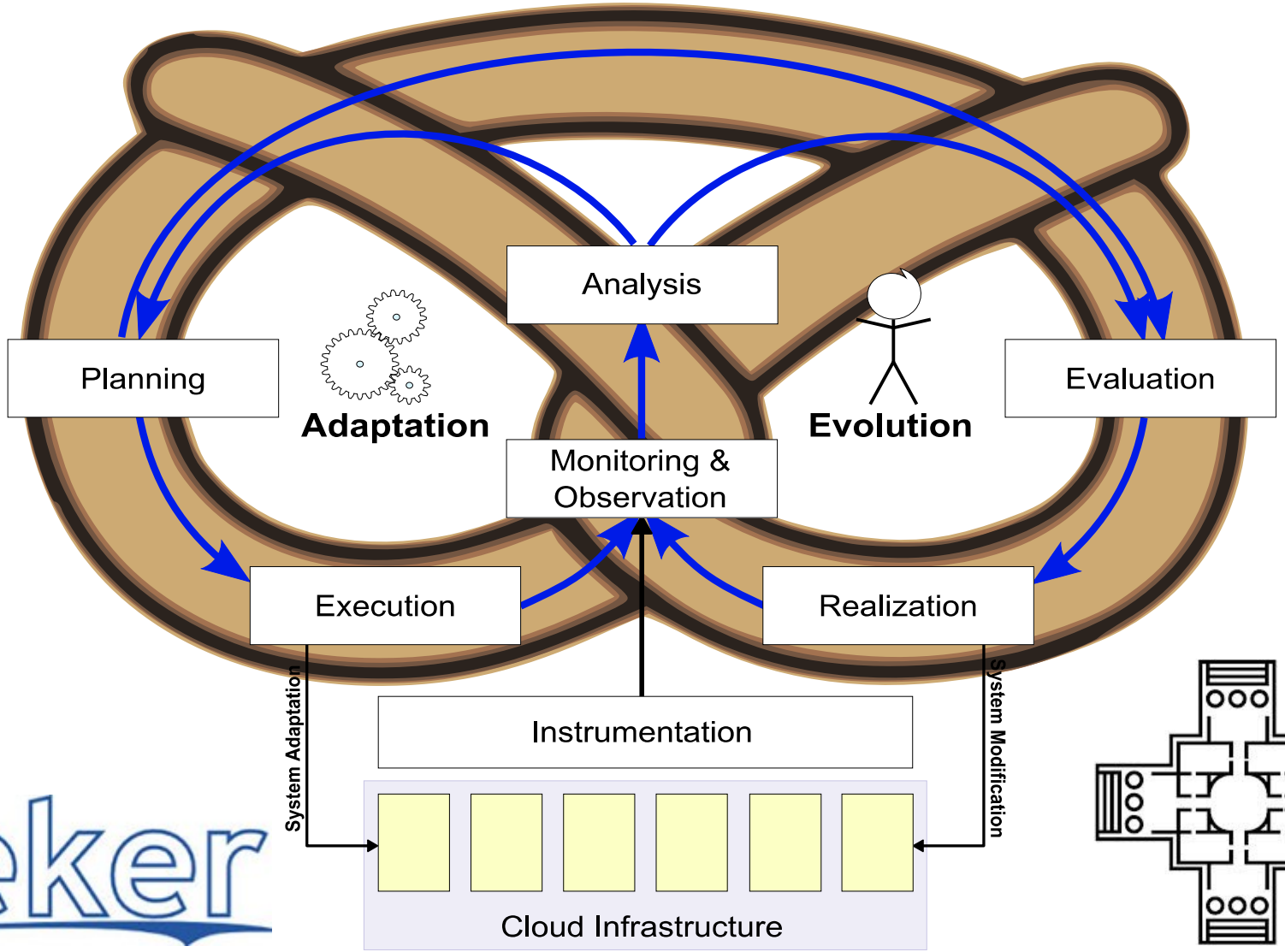
URES SecVolution MOCA ADVERT SW EVOLUTION IMPROVE EnSure



Run-time Reconfiguration

CoCoME – Evaluation Scenario




Analysis
Planning
Adaptation
Evolution
Evaluation
Monitoring & Observation
Execution
Realization
System Adaptation
System Modification
Instrumentation
Cloud Infrastructure

Kieker

What is iObserve about?

- Model-driven instrumentation of dynamic Cloud applications
- Run-time modeling for automated adaptation and manual evolution support
- Model-based analysis of performance and privacy

Status and Contributions

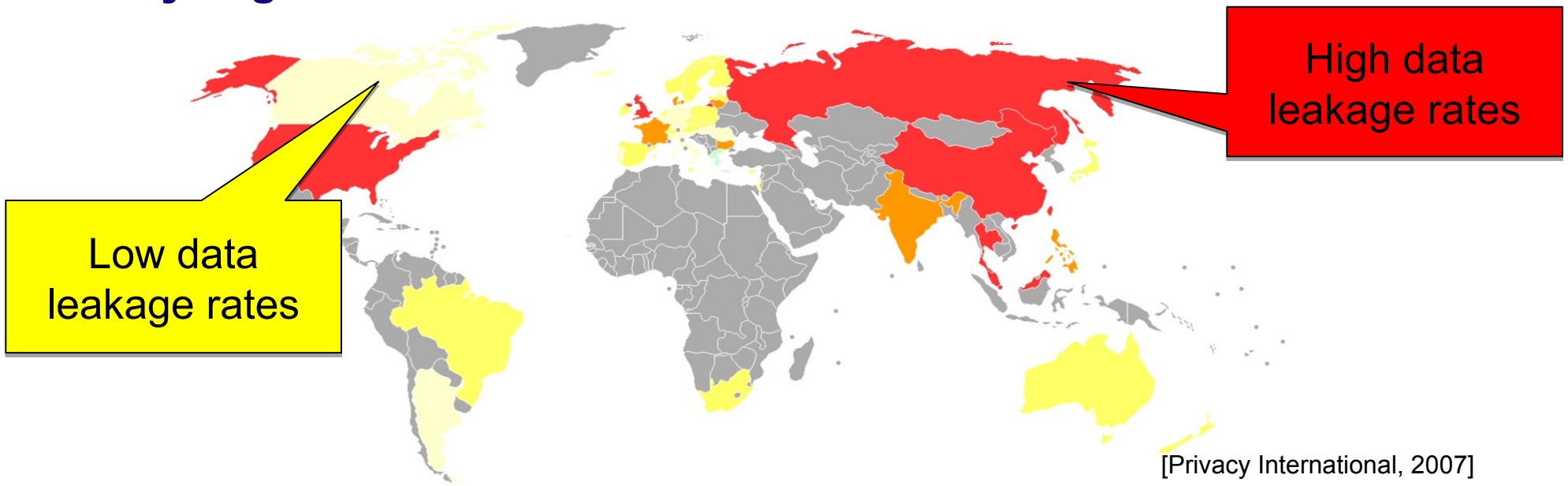
- Technology-independent and model-driven monitoring [KP2013]
- Integrated run-time modeling [MRT2014] covering …
  - executed system and its architecture models
  - design-time and run-time artifacts
- Aspect-oriented/view-based meta-model evolution [VAO2014]
- Data geo-location analysis for Cloud services [ICSOC2014]

Community Support

- Developed Cloud-based variant of CoCoME as a basis of the common workflow
- Instrumentation Record Language is official part of the Kieker project
  - www.kieker.org
- Organized workshop “Evolution and Maintenance of Long Living Systems” (EMLS)
- Dagstuhl Talks
  - Robert Heinrich – Integrating Observation and Modeling to Support Adaptation and Evolution of Software-intensive Systems
  - Eric Schmieders – Runtime Model based Privacy Checks of Cloud Services

- Privacy Checks of Large-Scale Architectural Models

Privacy Regulations



[Privacy International, 2007]

- Geo-Location matters (w.r.t. privacy)
- Regulations constrain data geo-locations (e.g., EU-DPD, HIPA, VPPA)
- Cloud changes data/software geo-location
- Use of cloud services threats regulation fulfilment

Long-term Goals

- 1st funding period ⊔ Monitoring (M) and Analysis (A)

- 2nd funding period ⊔ Planning (P) and Execution (E)
  - How does knowledge gathered in 1st period affect Planning and Execution?
  - Which adaptations are enabled by the new knowledge?
  - How do the new adaptations affect the Planning again?

Publications

R. Heinrich, E. Schmieders, R. Jung, K. Rostami, A. Metzger, W. Hasselbring, R. Reussner, and K. Pohl. Integrating run-time observations and design component models for cloud system analysis. In 9th International Workshop on Models at run.time, 2014.

TODO: ICSOC

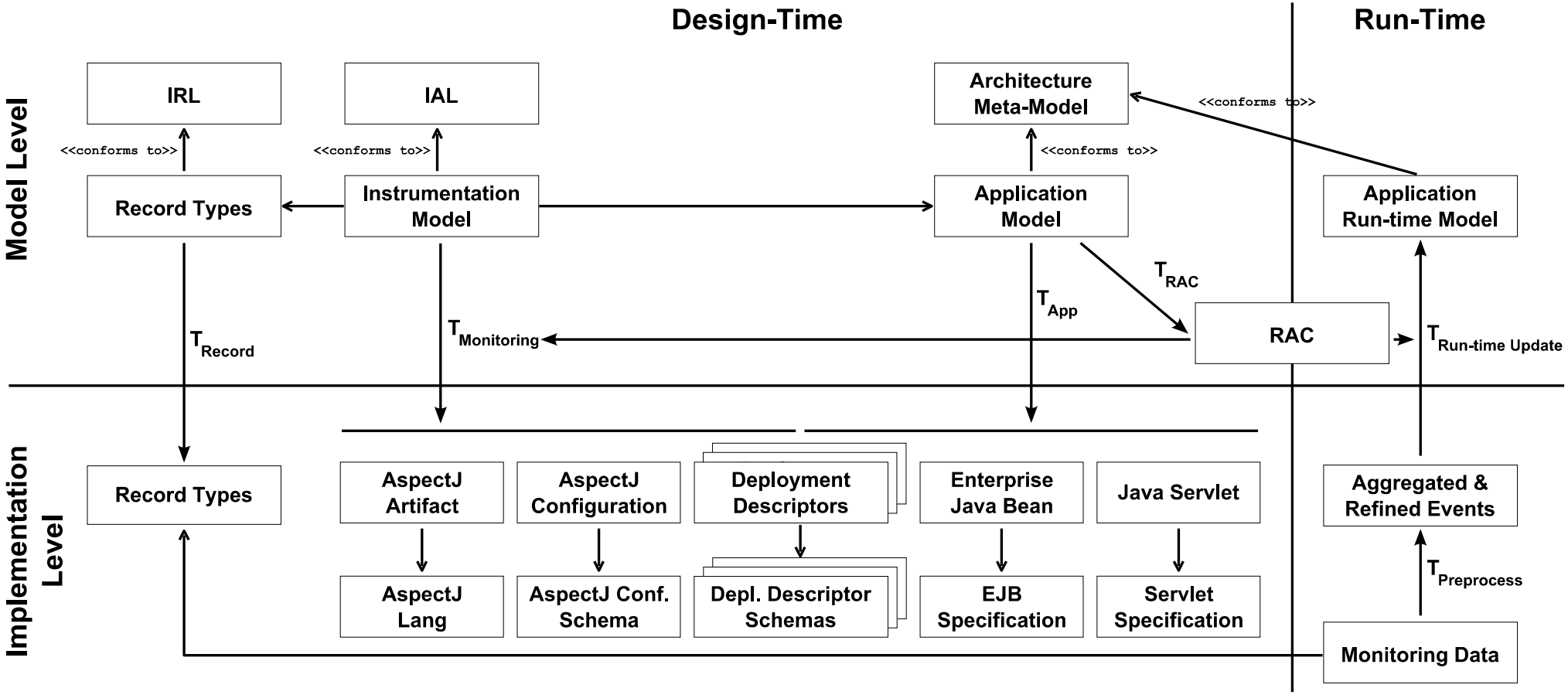
Reiner Jung, Robert Heinrich, Eric Schmieders, Misha Strittmatter and Wilhelm Hasselbring; A Method for Aspect-oriented Meta-Model Evolution Proceedings of the 2nd Workshop on View-Based, Aspect-Oriented and Orthographic Software Modelling, page 19-22.ACM, New York, NY, USA 2014

Christoph Heger and Robert Heinrich. Deriving work plans for solving performance and scalability problems. In *Computer Performance Engineering*, András Horváth and Katinka Wolter, editors, volume 8721 of *Lecture Notes in Computer Science*, pages 104-118. Springer International Publishing, 2014

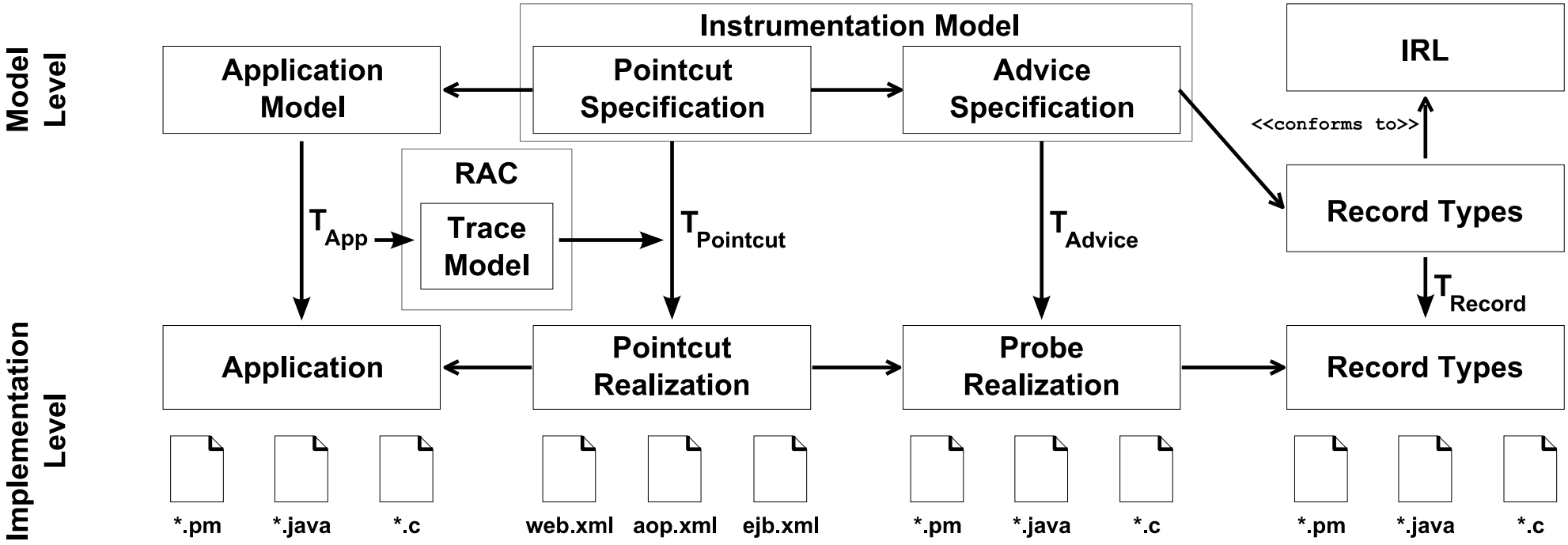
Reiner Jung, Robert Heinrich and Eric Schmieders; Model-driven Instrumentation with Kieker and Palladio to forecast Dynamic Applications; Proceedings Symposium on Software Performance: Joint Kieker/Palladio Days 2013 (KPDAYS 2013) Volume 1083 of CEUR Workshop Proceedings , page 99--108. CEUR 2013

Back-up Slides

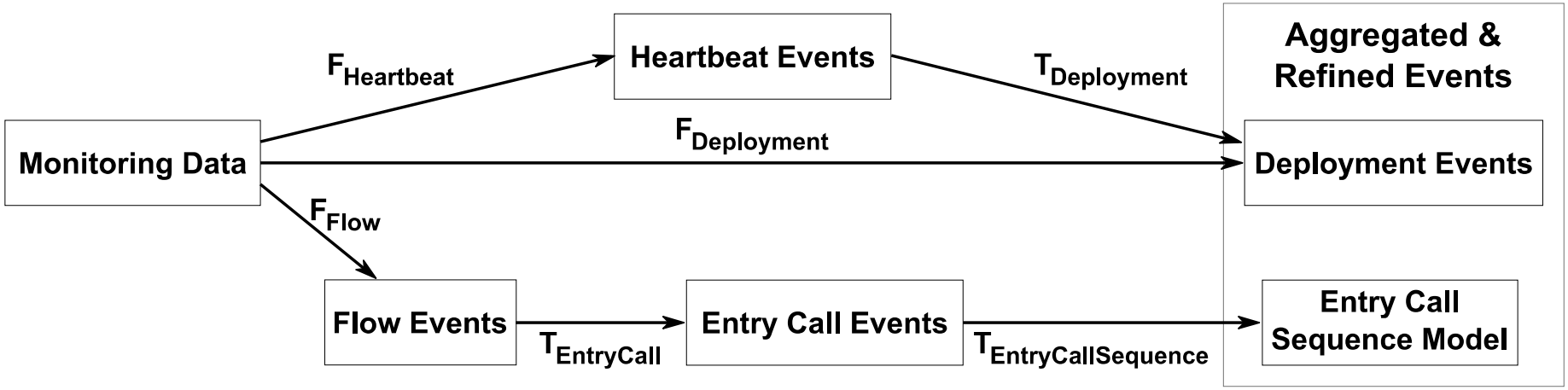
iObserve Mega-Model Overview



Design-Time: Realizing Monitoring



Run-Time: Processing Monitoring Data



Megamodel of the Preprocessing

- Filtering transformations select specific monitoring events
- Semantically rich events can be reconstructed (e.g., Deployment from Heartbeat)
- Reconstruction of entry calls from flow events
- Aggregation of entry call events to call sequences

Run-Time Architecture Correspondence Model