

Kieker.Workflow

Workflow Monitoring mit Kieker

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Arbeitsgruppe Software Engineering

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Agenda

-
- **Motivation**
 - **Anforderungen**
 - **Die Architektur**
 - **Ausblick**
-

Agenda

Motivation



Motivation

COMPUTER SCIENCE

Beyond the Data Deluge

Gordon Bell,¹ Tony Hey,¹ Alex Szalay²

Since at least Newton's laws of motion in the 17th century, scientists have recognized experimental and theoretical science as the basic research paradigms for understanding nature. In recent decades, computer simulations have become an essential third paradigm: a standard tool for scientists to explore domains that are inaccessible to theory and experiment, such as the evolution of the universe, car passenger crash testing, and predicting climate change. As simulations and experiments yield ever more data, a fourth paradigm is emerging, consisting of the techniques and technologies needed to perform data-intensive science (*1*). For example, new types of computer clusters are emerging that are optimized for data movement and analysis rather than computing, while in astronomy and other sciences, integrated data systems allow data analysis and storage on site instead of requiring download of large amounts of data.

Today, some areas of science are facing hundred- to thousandfold increases in data volumes from satellites, telescopes, high-

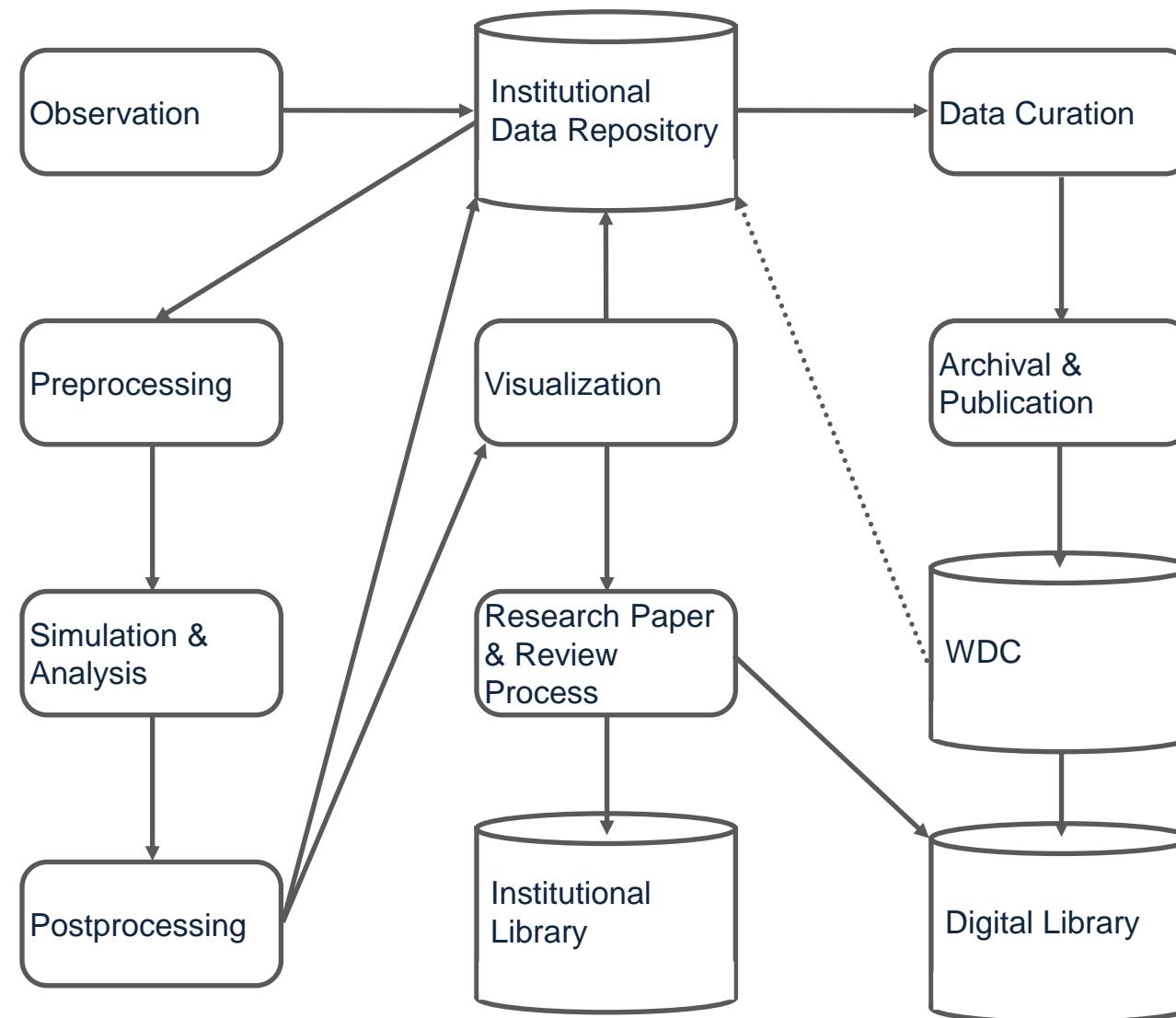
The demands of data-intensive science represent a challenge for diverse scientific communities.

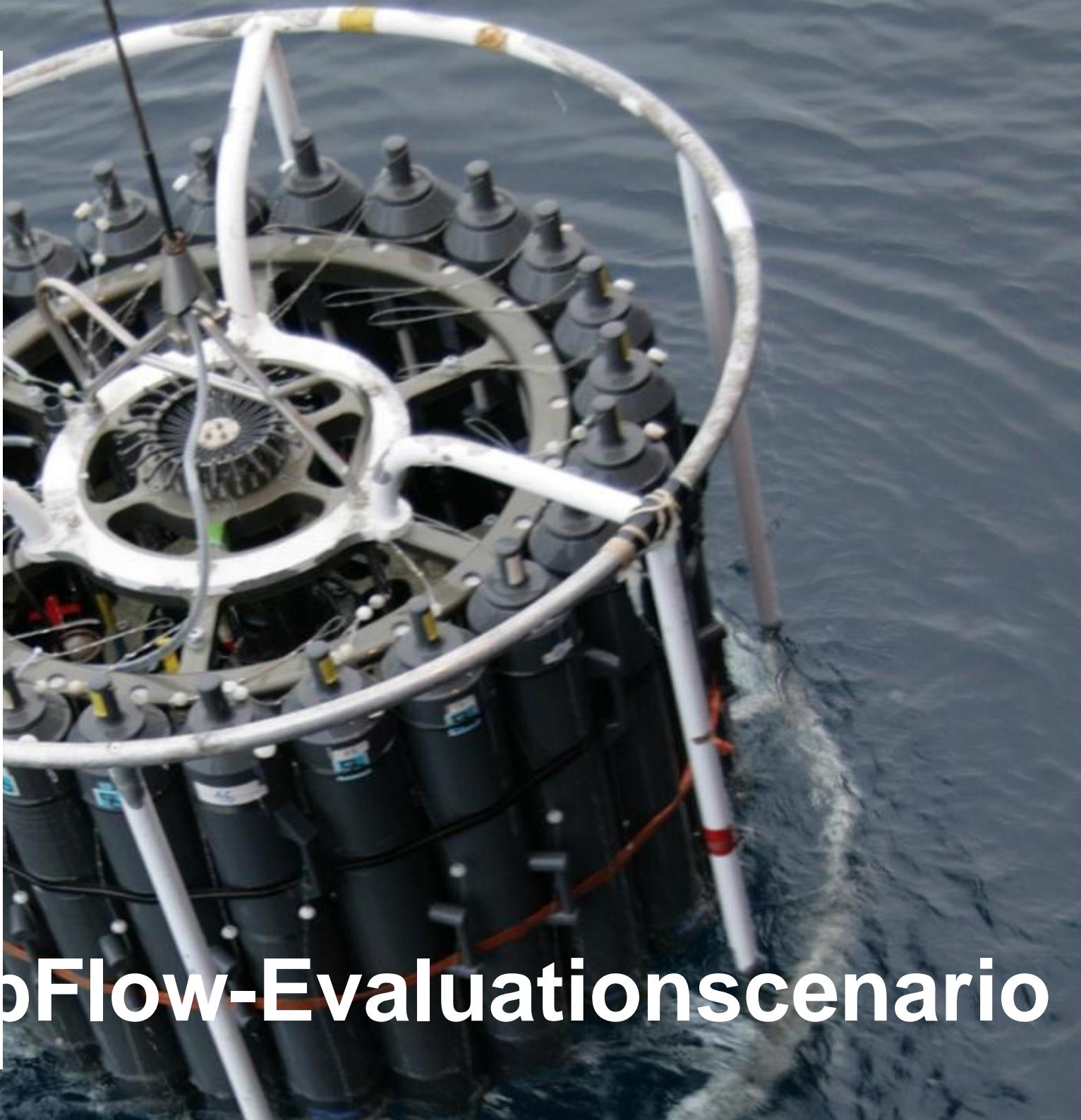
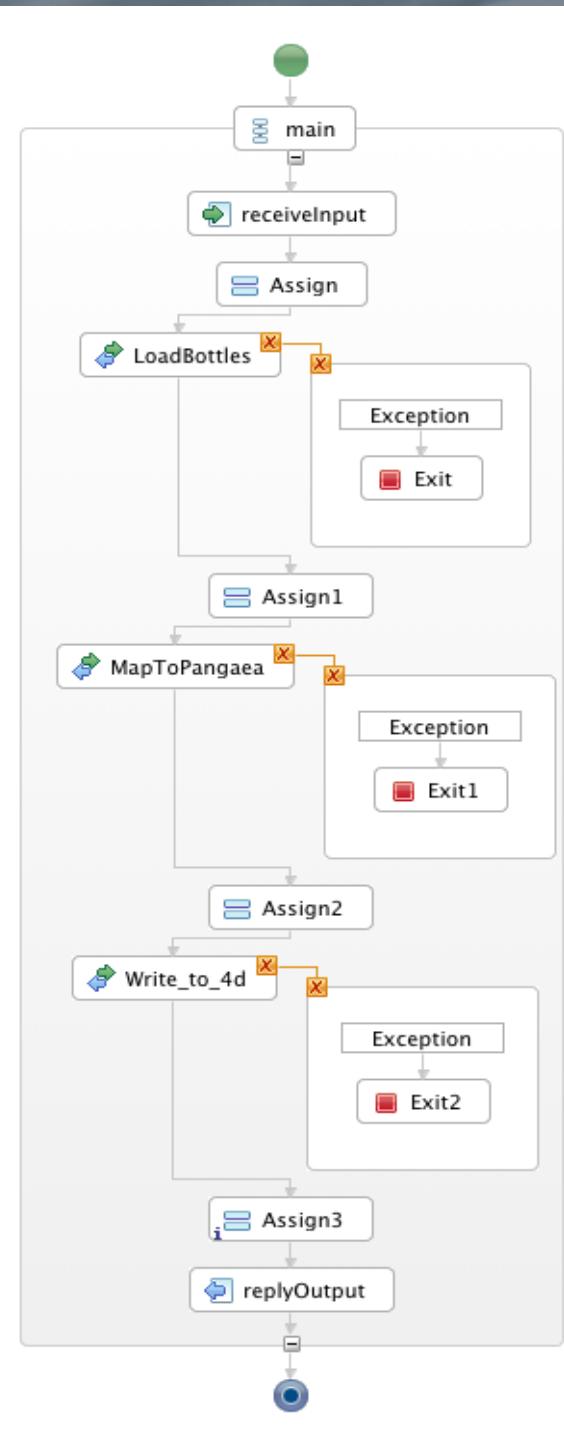


Moon and Pleiades from the VO. Astronomy has been one of the first disciplines to embrace data-intensive science with the Virtual Observatory (VO), enabling highly efficient access to data and analysis tools at a centralized site. The image shows the Pleiades star cluster from the Digitized Sky Survey combined with an image of the Moon synthesized within the *World Wide Telescope*.

http://www.cloudinnovation.com.au/Bell_Hey%20_Szalay_Science_March_2009.pdf

Motivation





bFlow-Evaluationscenario

Motivation

ZEIT
ONLINE | WISSEN

GEFÄLSCHTE FORSCHUNG

Genetiker Hwang Woo Suk verurteilt

Hwang Woo Suk wurde für seine Erfolge beim Klonen gefeiert – bis er als Fälscher aufflog. Ein Gericht in Seoul hat den Genetiker zu einer Bewährungsstrafe verurteilt.

26. Oktober 2009 - 17:14 Uhr

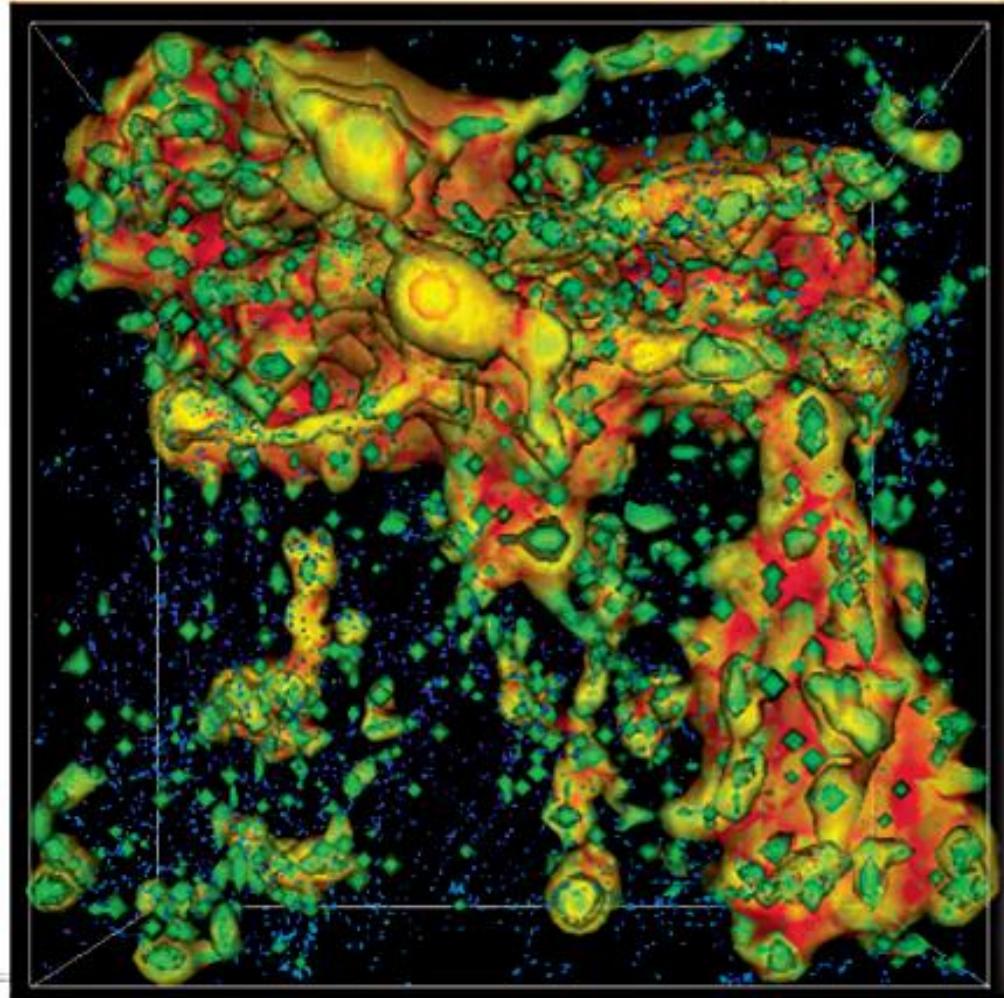
© Park Ji-Hwan/AFP/Getty Images



Vom Helden der Wissenschaft zum verurteilten Kriminellen: Der südkoreanische Klon-Spezialist Hwang Woo Suk nach der Urteilsverkündung

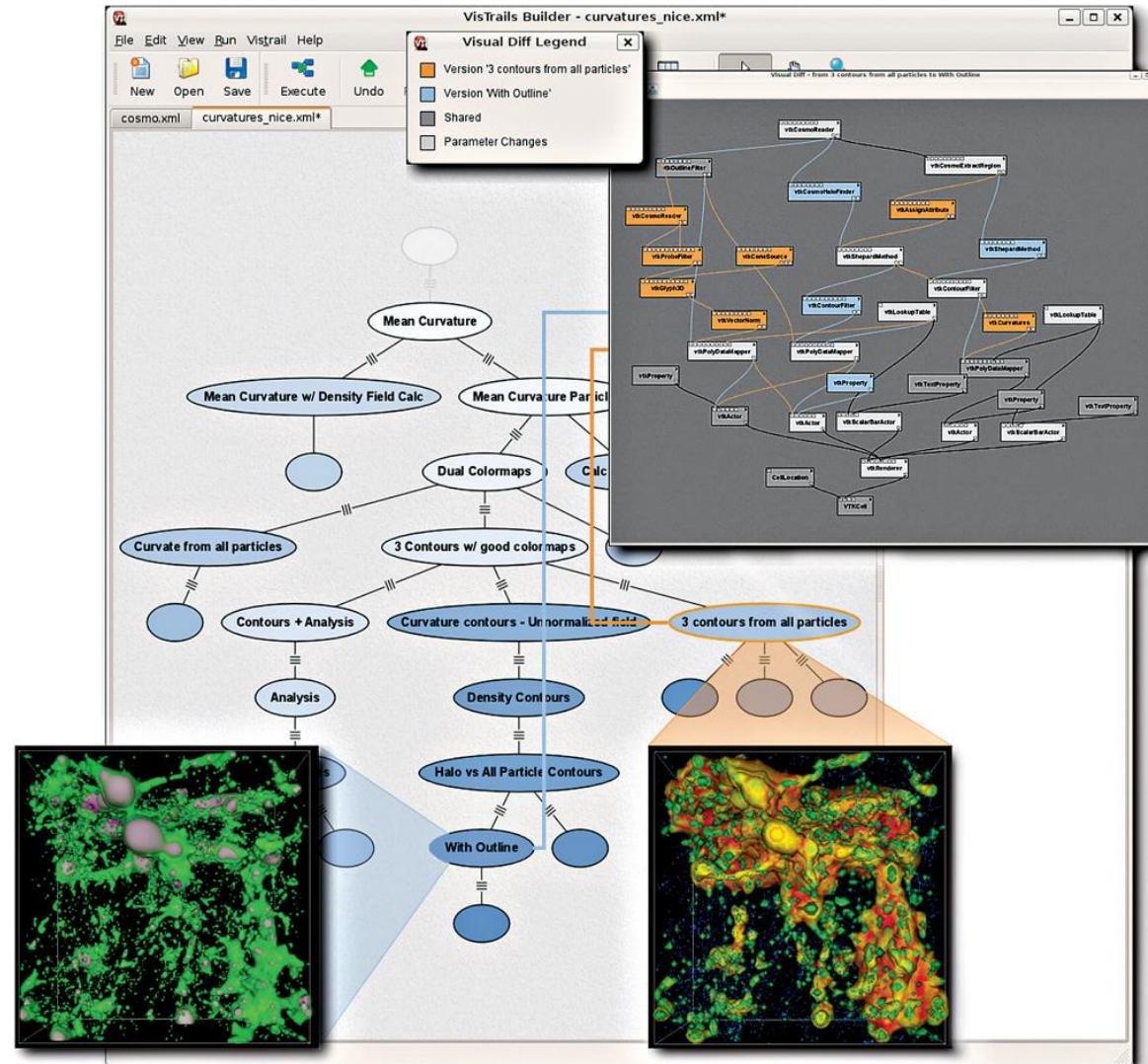
Verifizierbarkeit

Motivation



Nachvollziehbarkeit

Motivation



Wiederholbarkeit

Motivation

**Erfassung der Provenienz-
Informationen per Workflow
Monitoring**



Agenda

Anforderungen

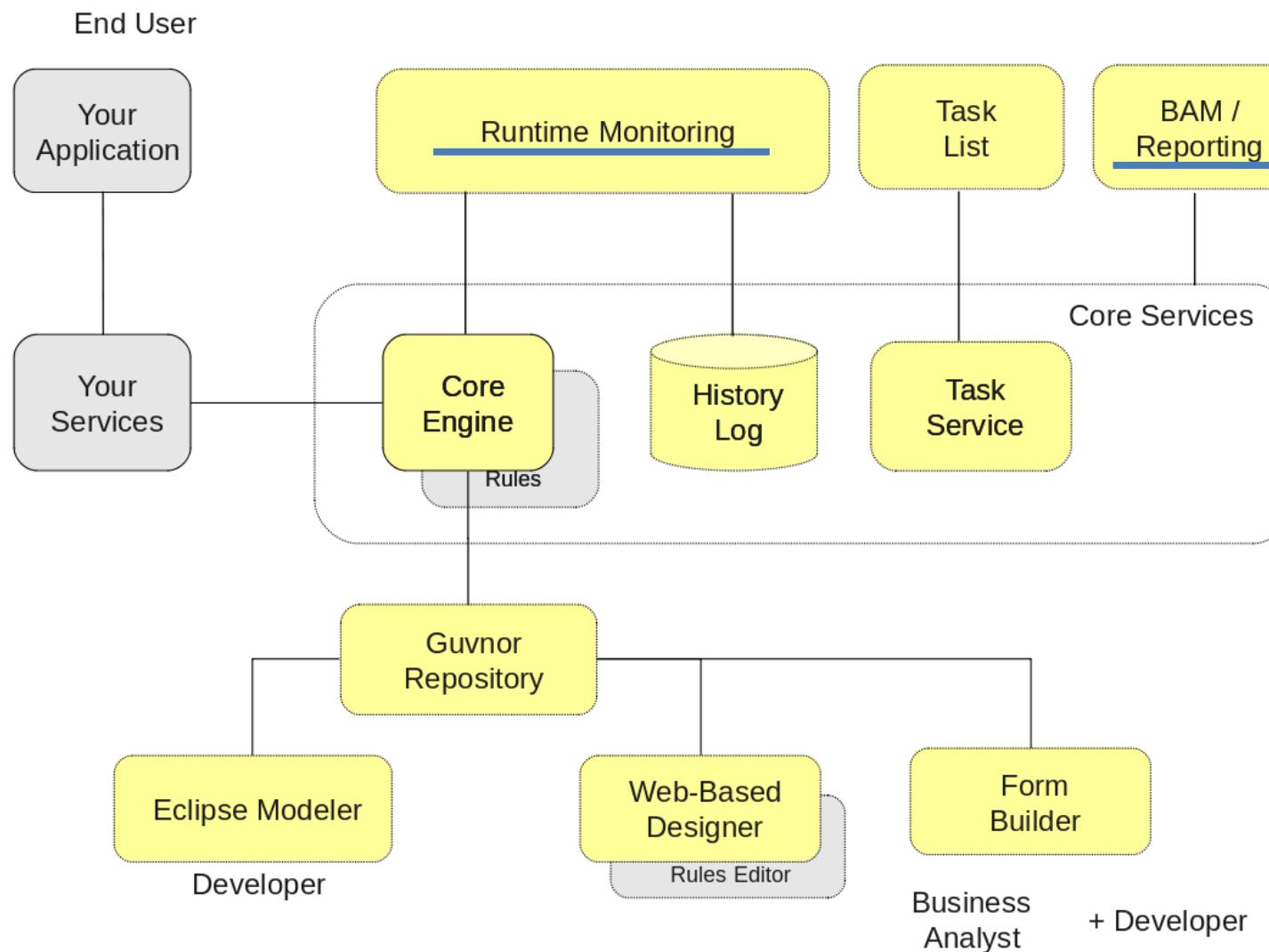
Anforderungen

Identifizierte Anforderungen

- **Ganzheitlicher Monitoring Ansatz**
- **Sparsamer Umgang mit Ressourcen**
- **Konfigurierbarkeit**
- **Einfache Bedienbarkeit**

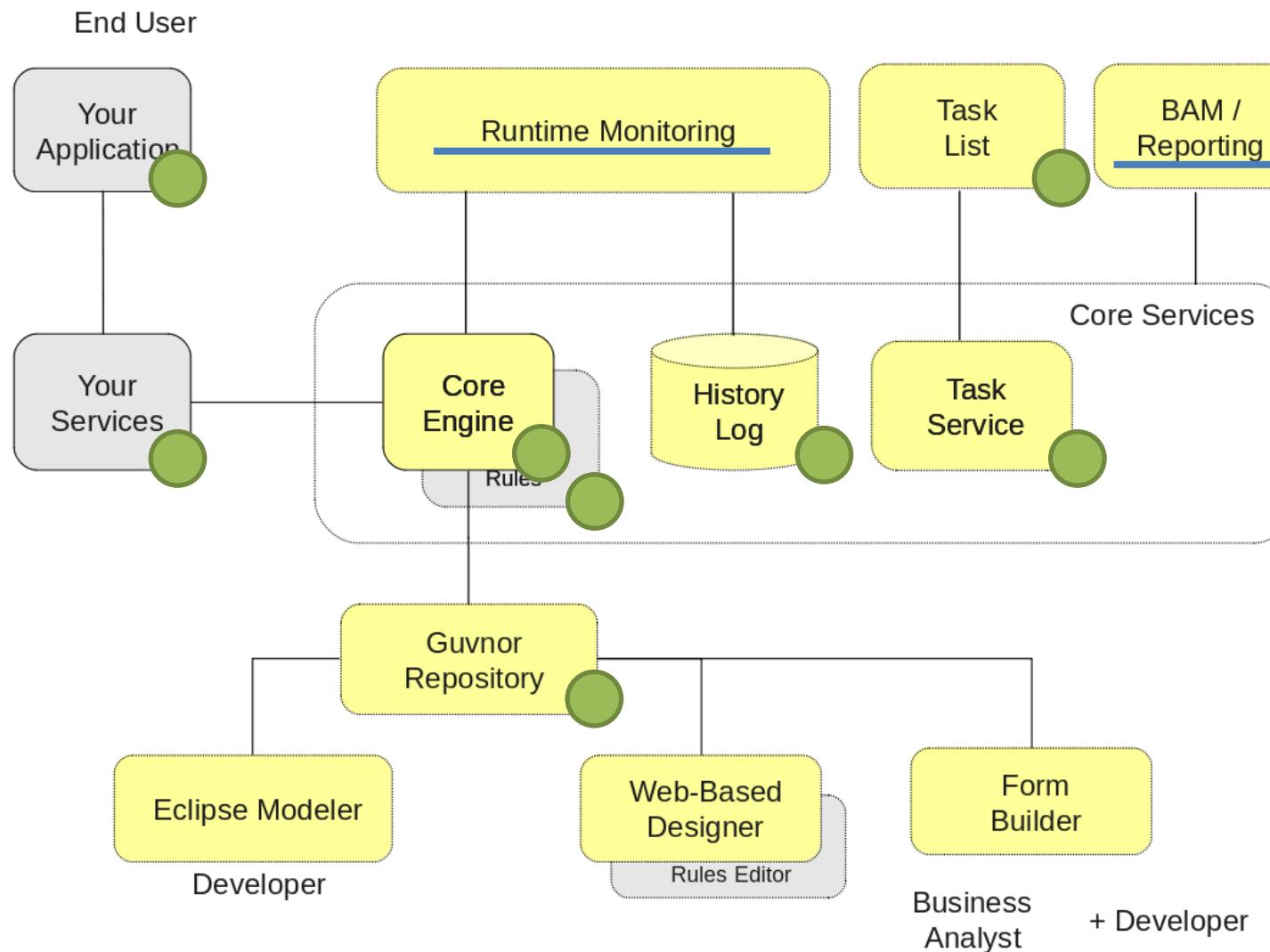
Anforderungen

Ganzheitlicher Monitoring Ansatz



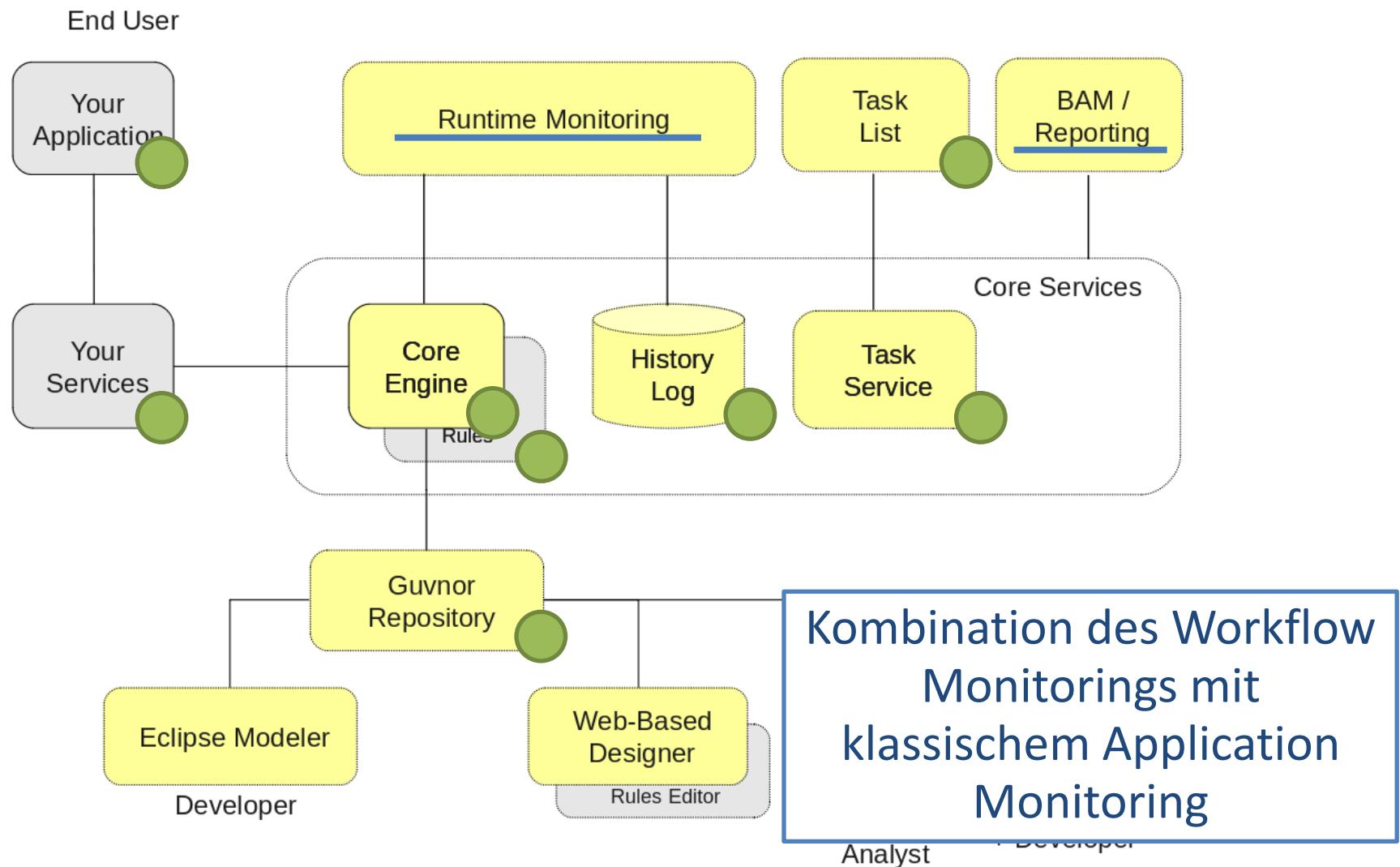
Anforderungen

Ganzheitlicher Monitoring Ansatz



Anforderungen

Ganzheitlicher Monitoring Ansatz



Anforderungen

Sparsamer Umgang mit Ressourcen

The default behavior for the engine is to always generate all events for every executed action. ... Inserting all these events generates a non-negligable overhead.

Anforderungen

Sparsamer Umgang mit Ressourcen

- **Trennung von Monitoring und Auswertung**
- **Steuerung des Monitoring-Verhaltens**
- **Partielle Auswertung der Ergebnisse**

Anforderungen

Konfigurierbarkeit

- **Steuerung des Monitoring-Verhaltens automatisch über Profile**
- **Steuerung des Monitoring-Verhaltens manuell über MBeans**

Anforderungen

Konfigurierbarkeit

- **Steuerung des Monitoring-Verhaltens automatisch über Profile**

```
<monitor:profile name="provenanceLight,">
    <monitor:targetelement type="activity,,>
        <monitor:eventtype>activityEnabledEvent</monitor:eventtype>
        <monitor:eventtype>activityDisabledEvent</monitor:eventtype>
    </monitor:targetelement>
    ...
    <monitor:targetelement type="variable,,>
        <monitor:eventtype>VariableModificationEvent</monitor:eventtype>
        <monitor:eventtype>VariableReadEvent</monitor:eventtype>
    </monitor:targetelement>
    ...
    <monitor:event type="VariableModificationEvent,>
        <monitor:fokus>varName</monitor:fokus>
        <monitor:fokus>newValue</monitor:fokus>
    </monitor:event>
<monitor:profile>
```

Anforderungen

Konfigurierbarkeit

- Steuerung des Monitoring-Verhaltens manuell über MBeans

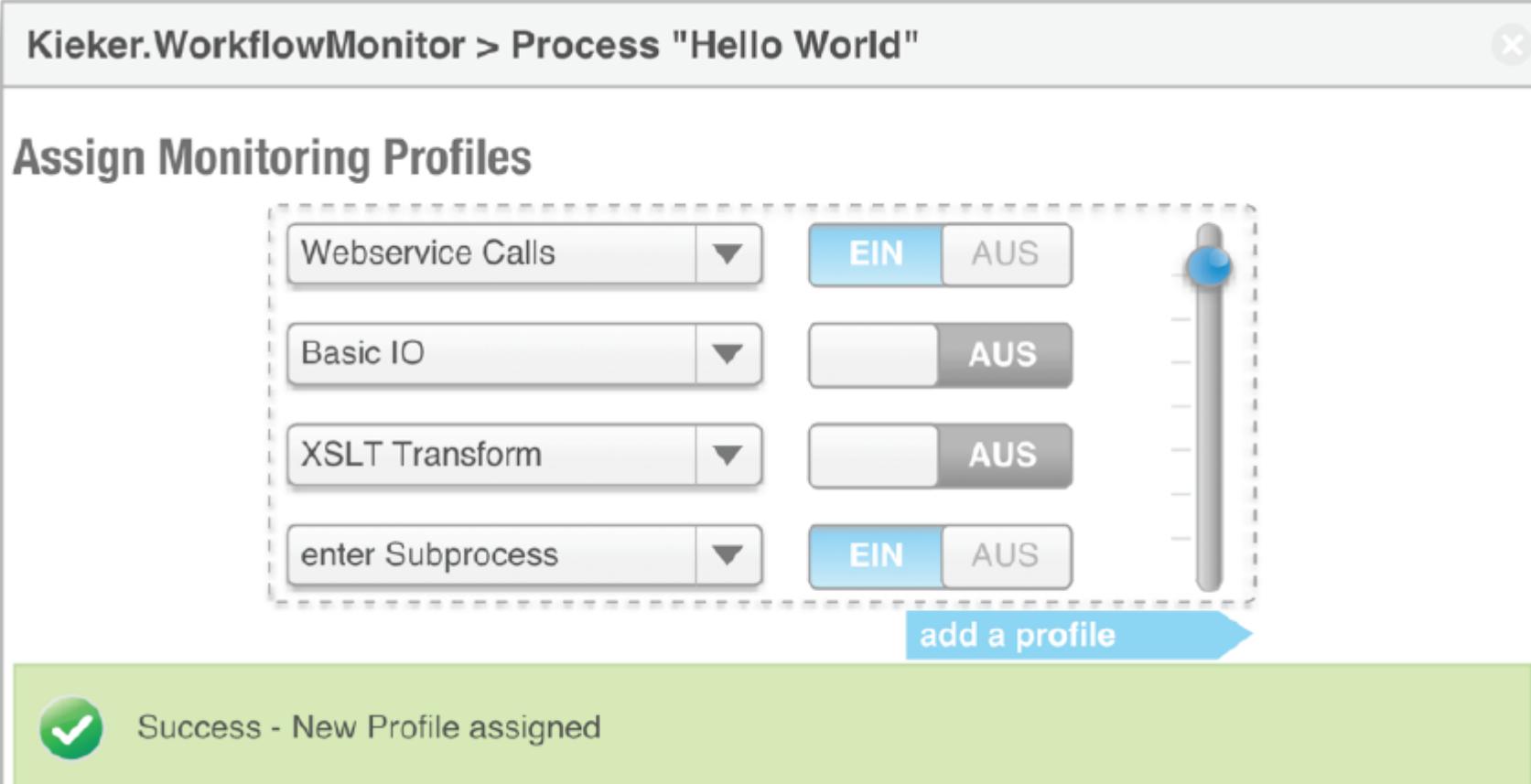
Kieker.WorkflowMonitor > Process "Hello World"

Assign Monitoring Profiles

Webservice Calls	EIN	AUS
Basic IO		AUS
XSLT Transform		AUS
enter Subprocess	EIN	AUS

add a profile

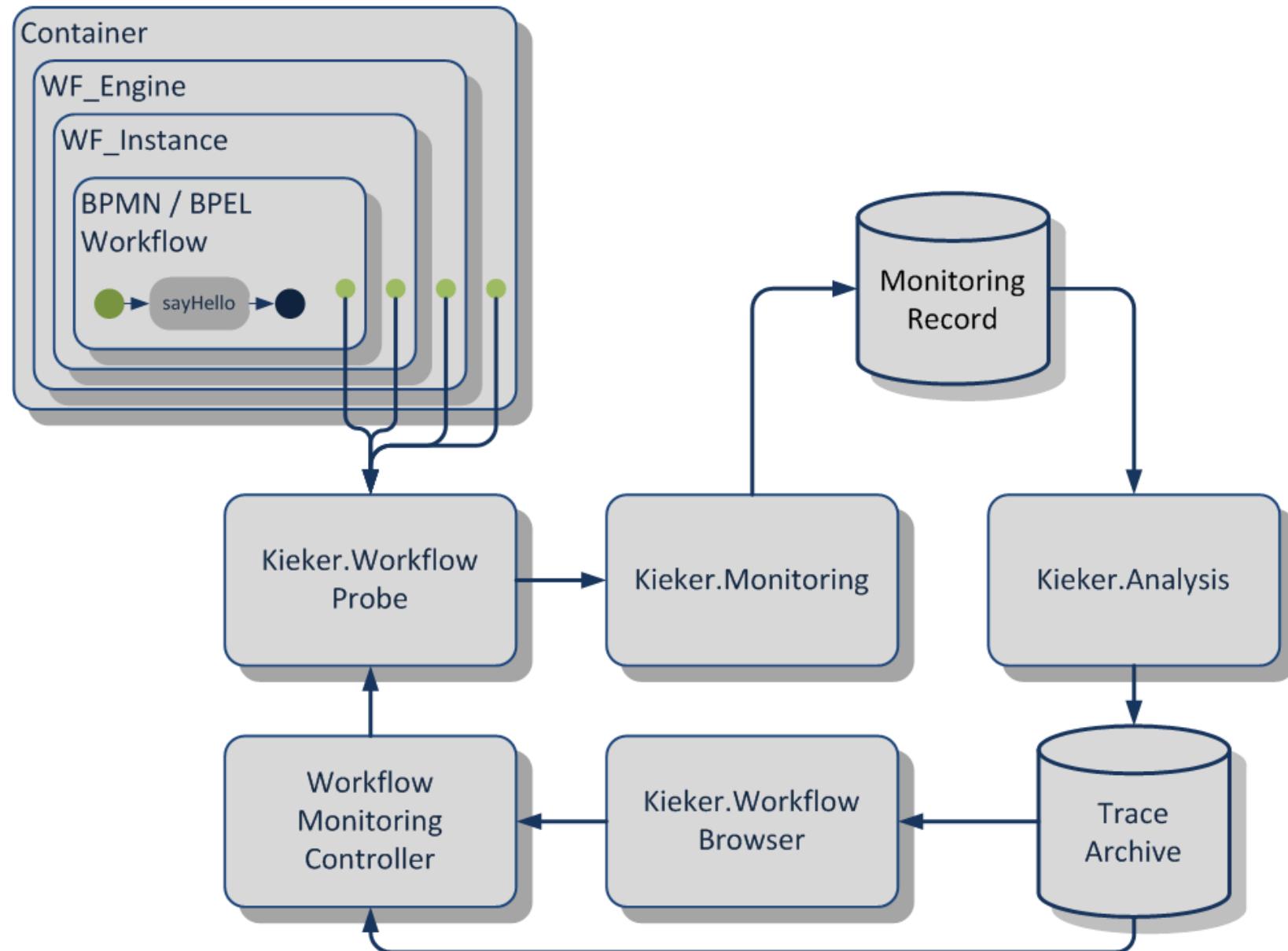
Success - New Profile assigned



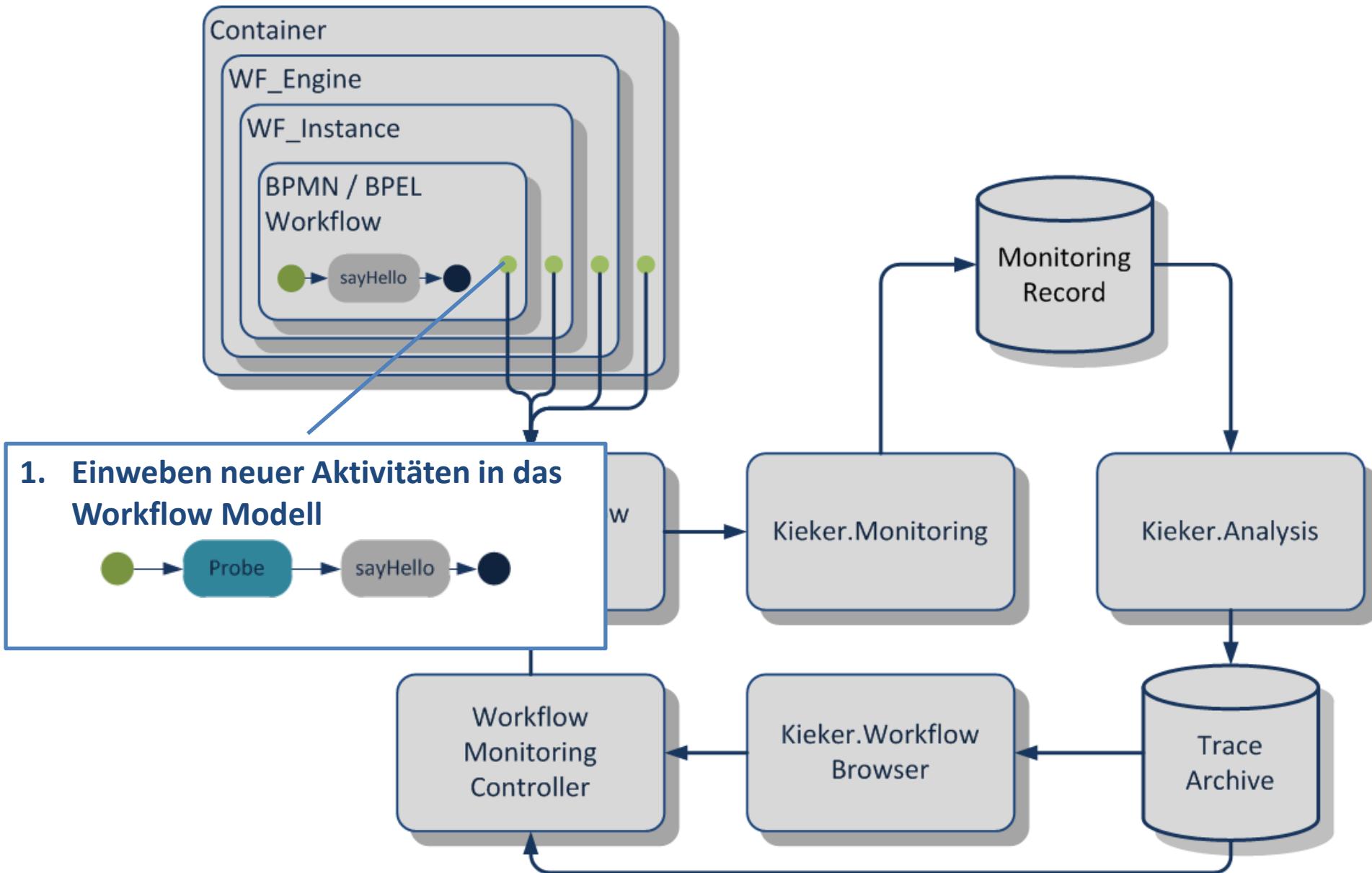
Agenda

Die Architektur

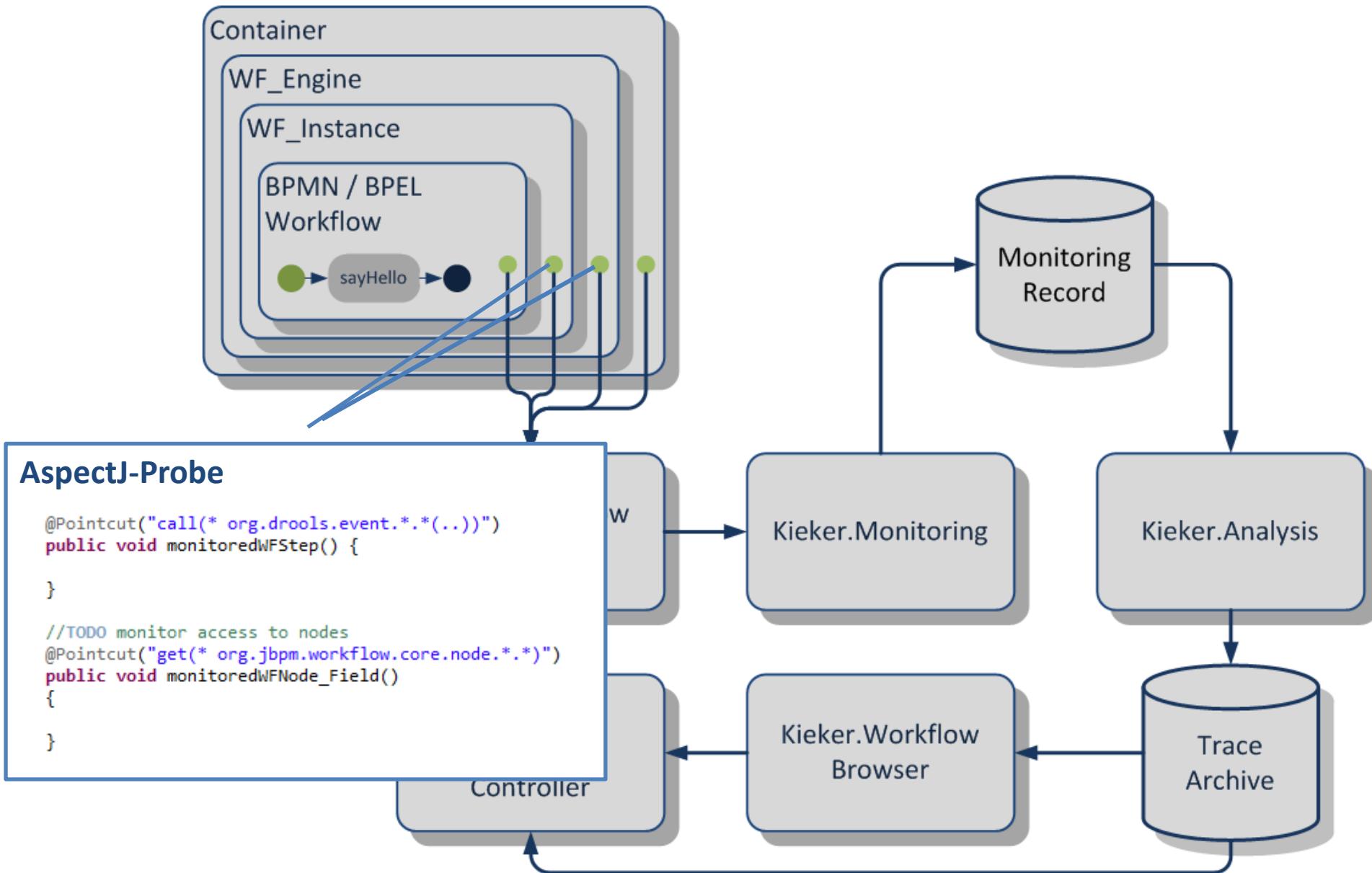
Architektur



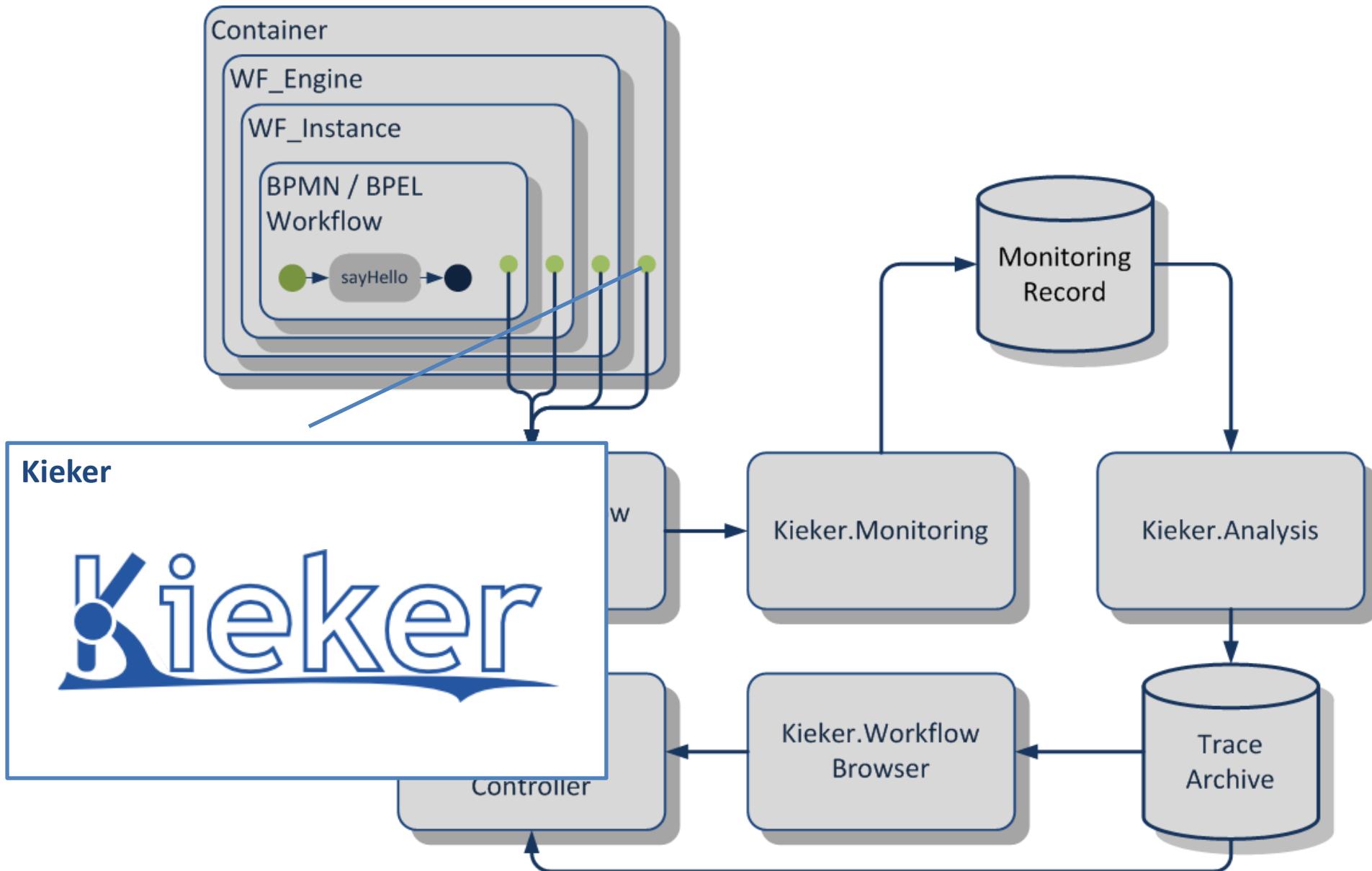
Architektur



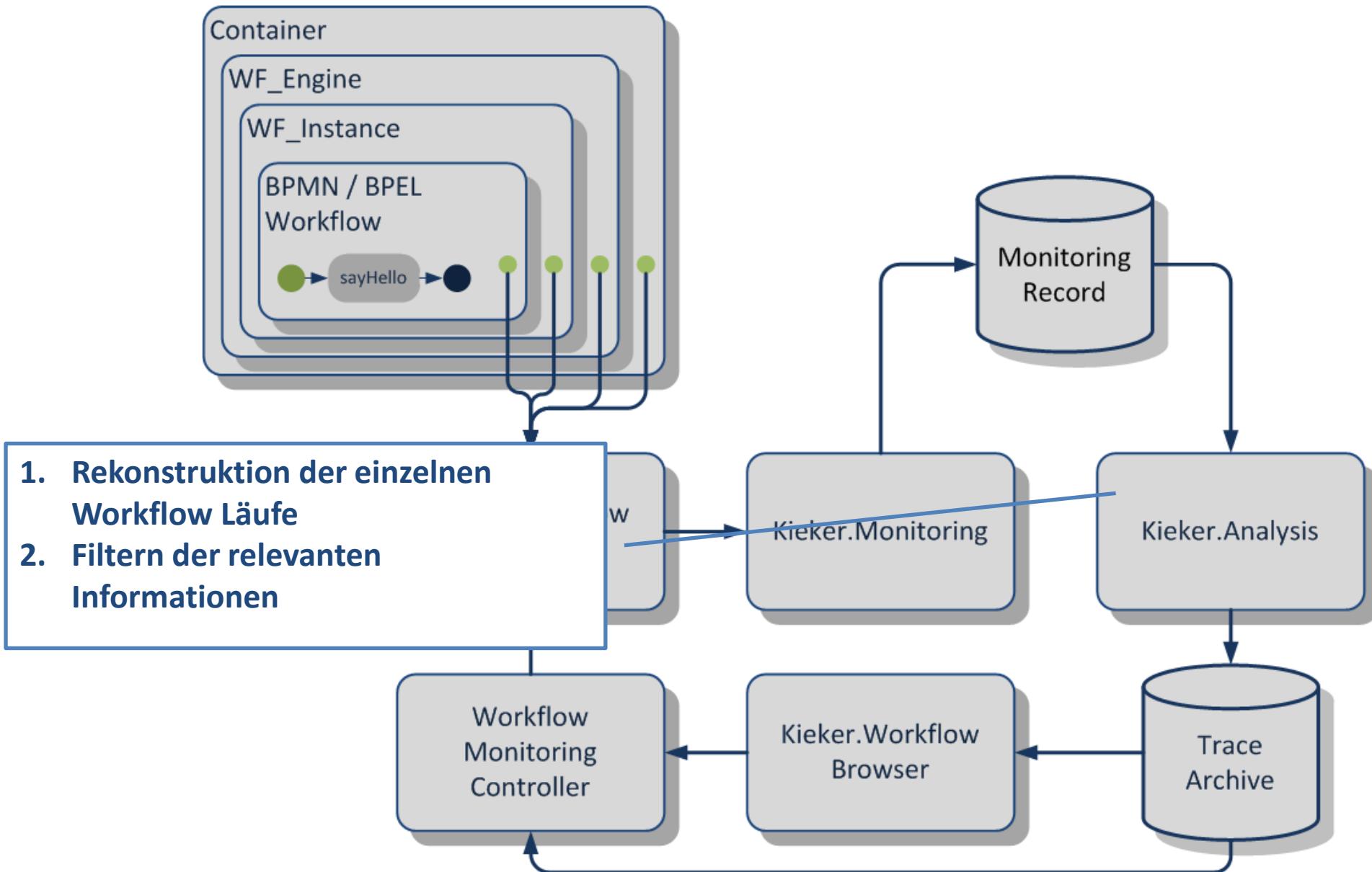
Architektur



Architektur



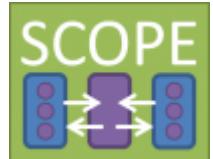
Architektur



Architektur

Scope

<http://scope-dsl.sourceforge.net>

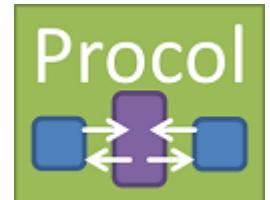


- DSL zur Beschreibung eines Scope-Koordinierungsmodels
- Beschreibt in einem Workflow-Modell den Zugriff auf die geteilten Ressourcen
- Ist BPMN 2.0 konform

Architektur

Procol

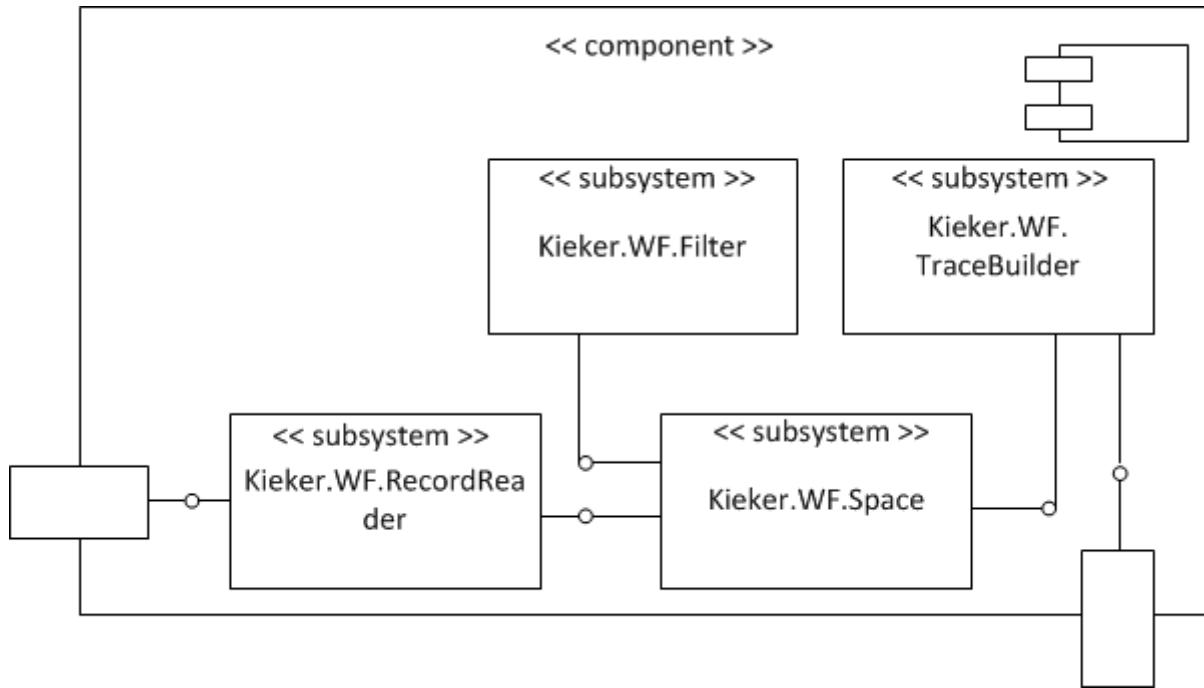
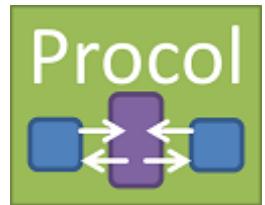
<http://procol.sourceforge.net>



- Framework für Space-basierte Multicore
- Programmierung
- Trennung von Fachlogik und Nebenläufiger Programmierung
- Basiert auf LightTS TupleSpace Framework

Architektur

Space basierte Analyse-Komponente



Architektur

Space basierte Analyse-Komponente

```
definitions org.scope.target.gen.workflowMonitoring.processes
{ ...

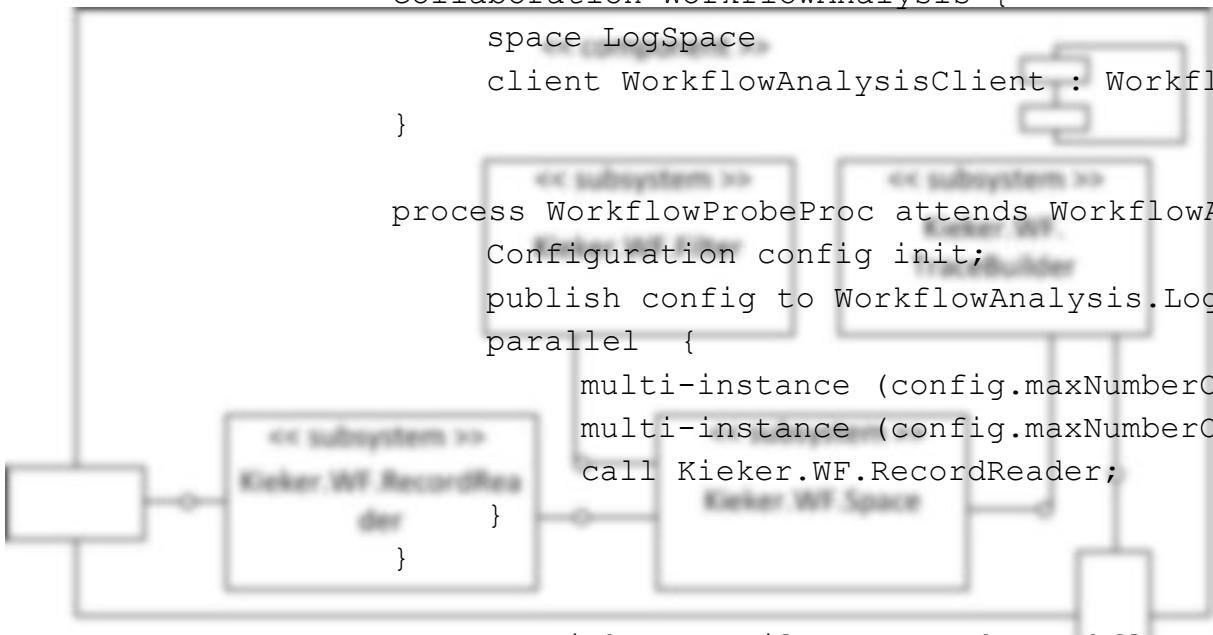
    collaboration WorkflowAnalysis {
        space LogSpace
        client WorkflowAnalysisClient : WorkflowAnalysisProc
    }

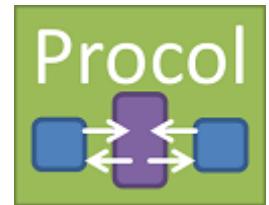
    process WorkflowProbeProc attends WorkflowAnalysis {
        Configuration config init;
        publish config to WorkflowAnalysis.LogSpace;
        parallel {
            multi-instance (config.maxNumberOfReceivers) call Kieker.WF.Filter;
            multi-instance (config.maxNumberOfPreprocessors) call Kieker.WF.TraceBuilder;
            call Kieker.WF.RecordReader;
        }
    }

    process Kieker.WF.Filter attends WorkflowAnalysis { ... }

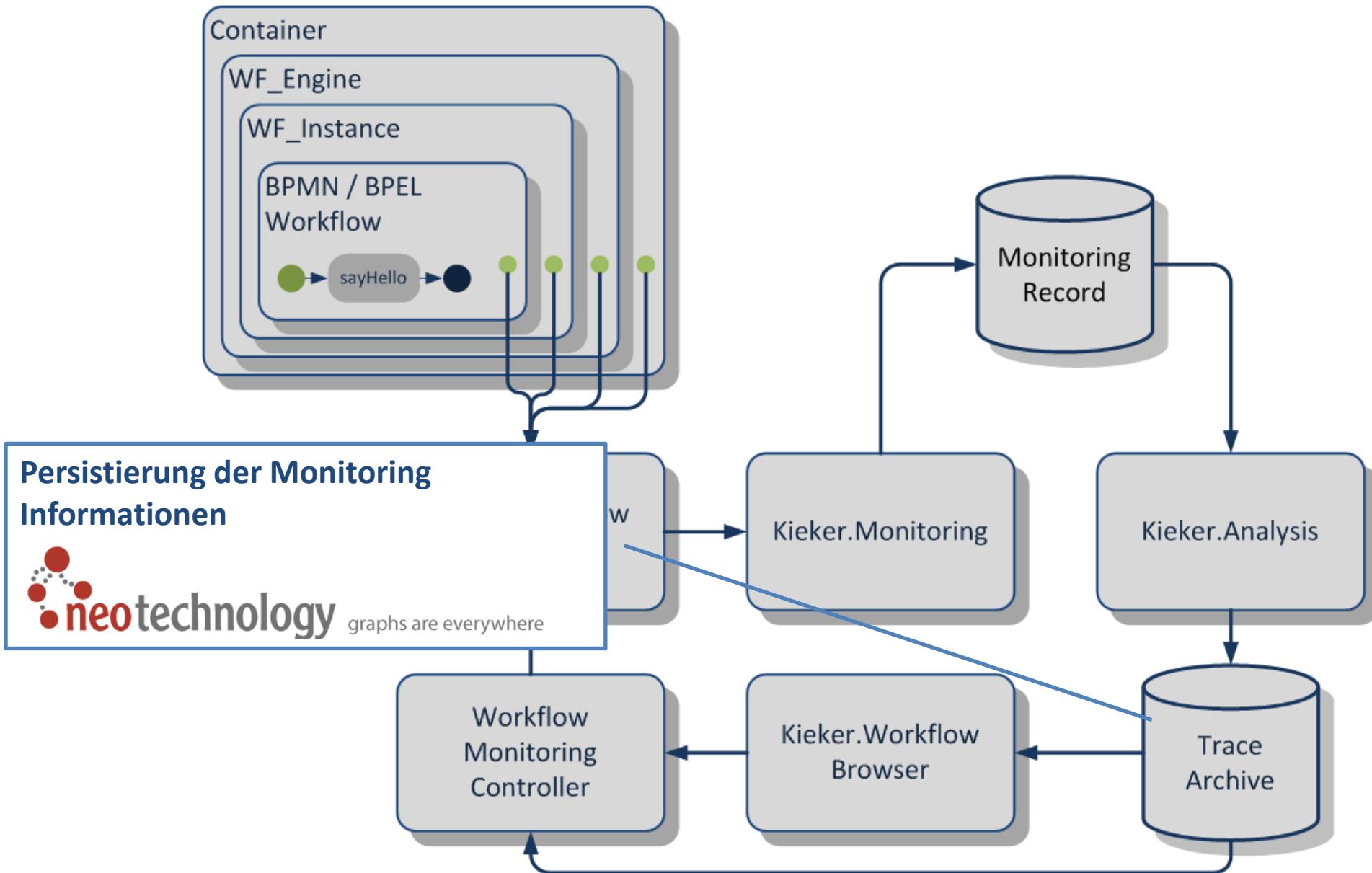
    process Kieker.WF.TraceBuilder attends WorkflowAnalysis { ... }

    process Kieker.WF.RecordReader attends WorkflowAnalysis { ... }
}

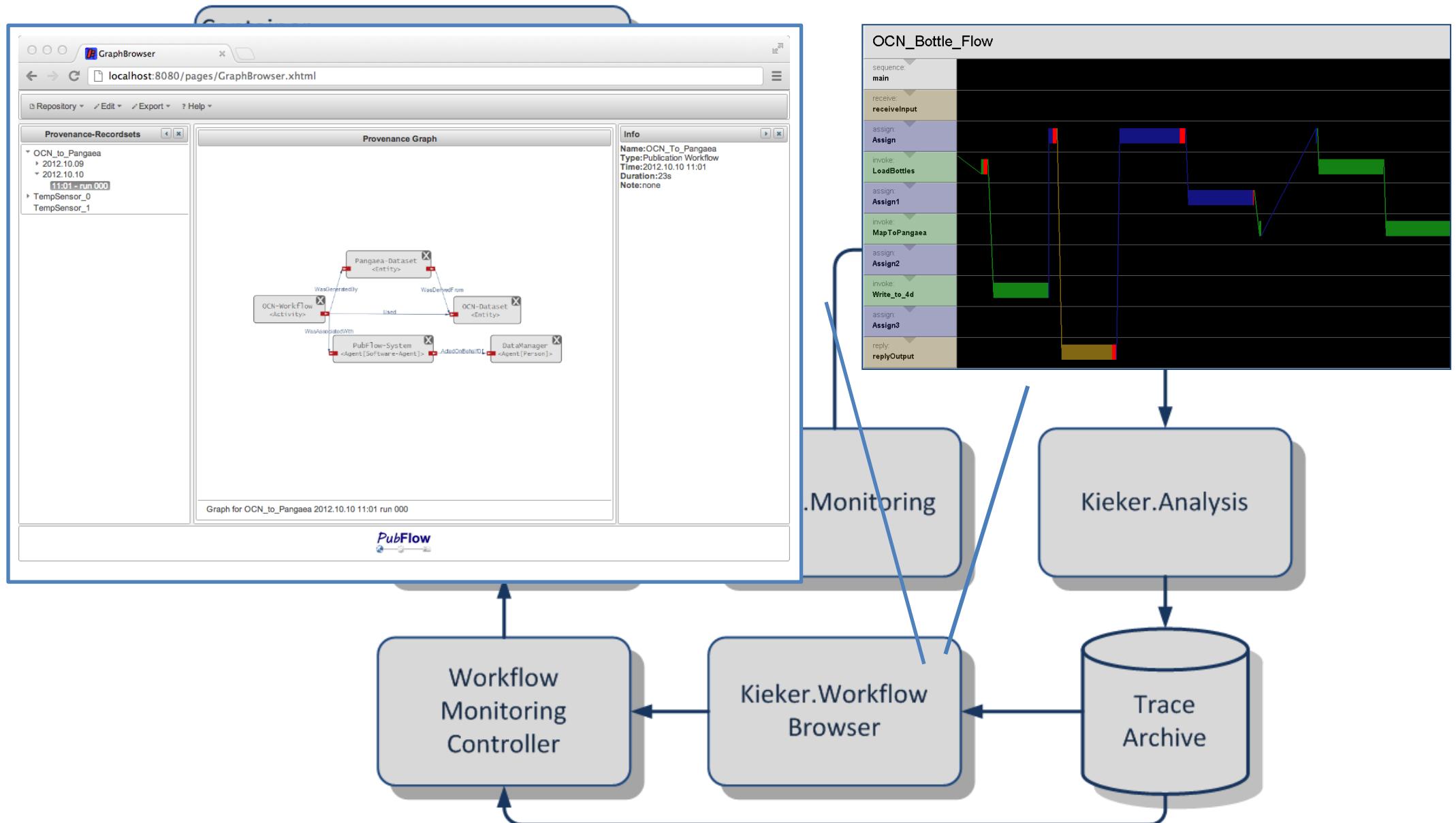

```



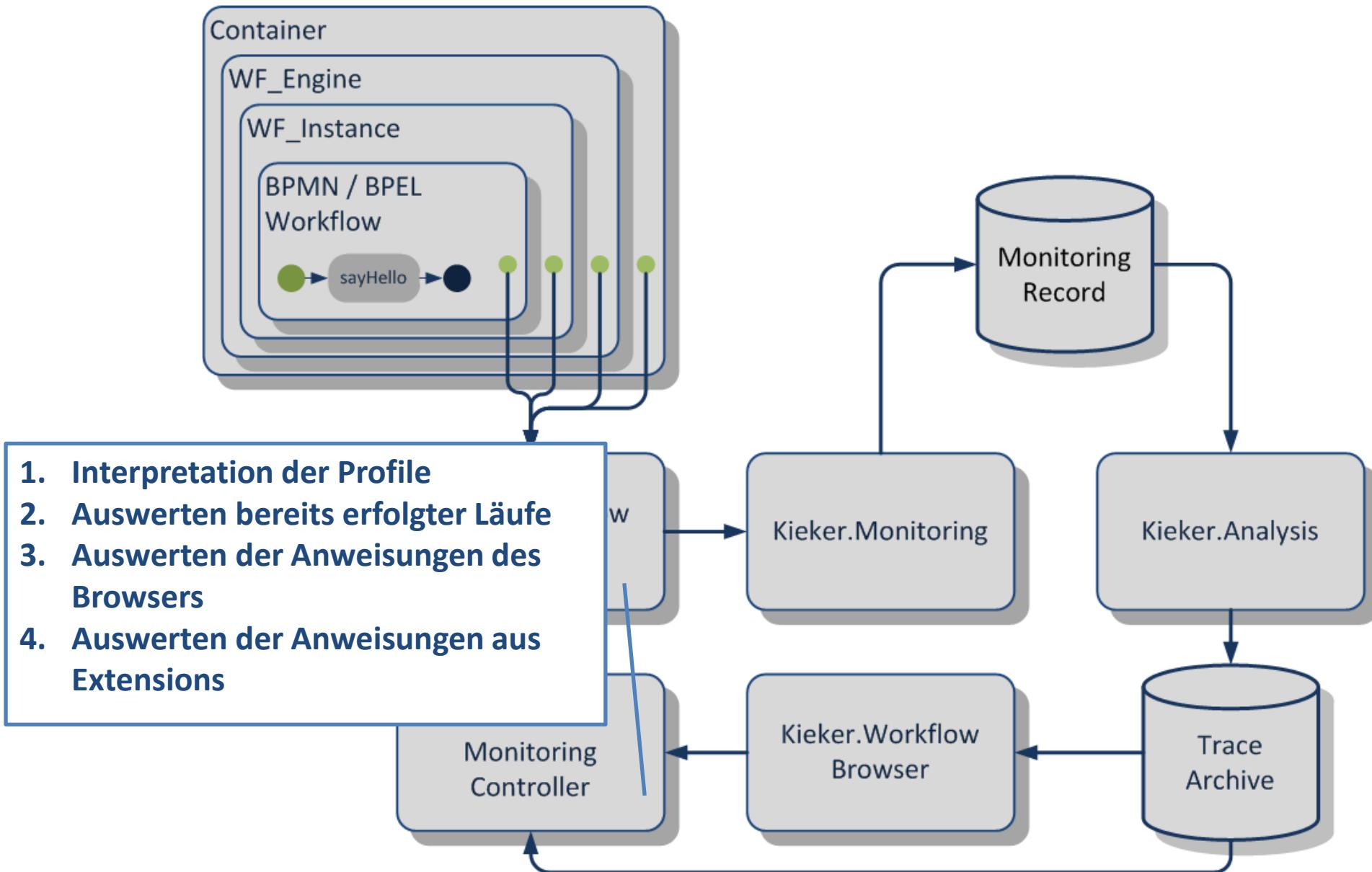
Architektur



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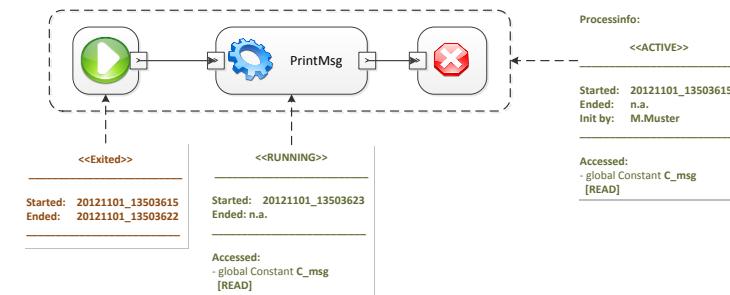


Architektur



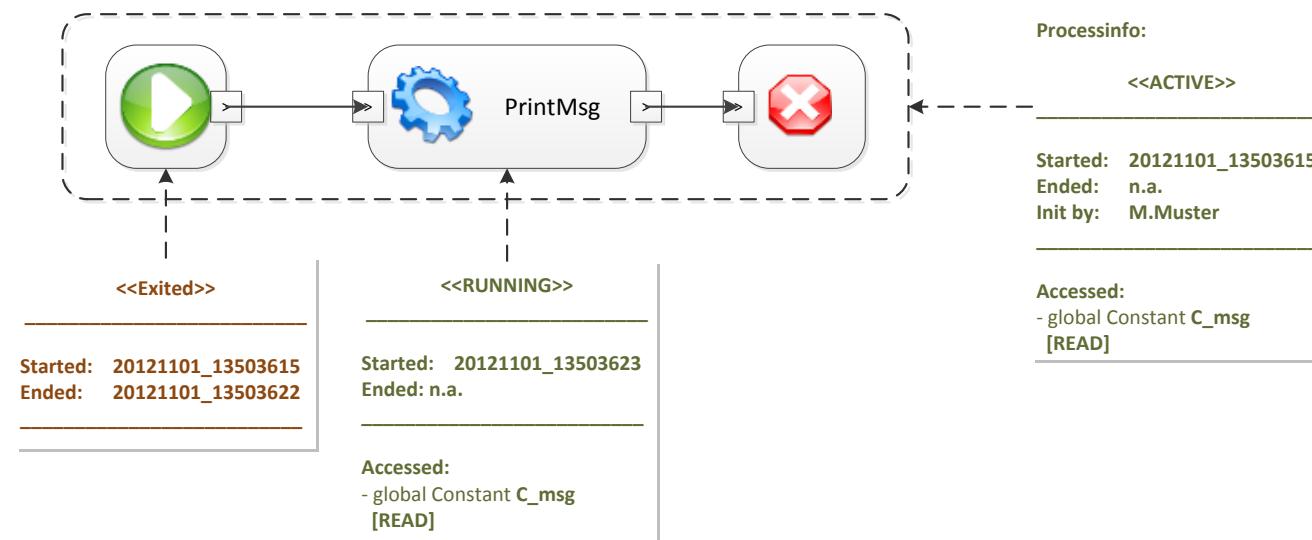
Agenda

Ausblick



Ausblick

Grafische Darstellung der Ergebnisse in der WebGUI



Ausblick

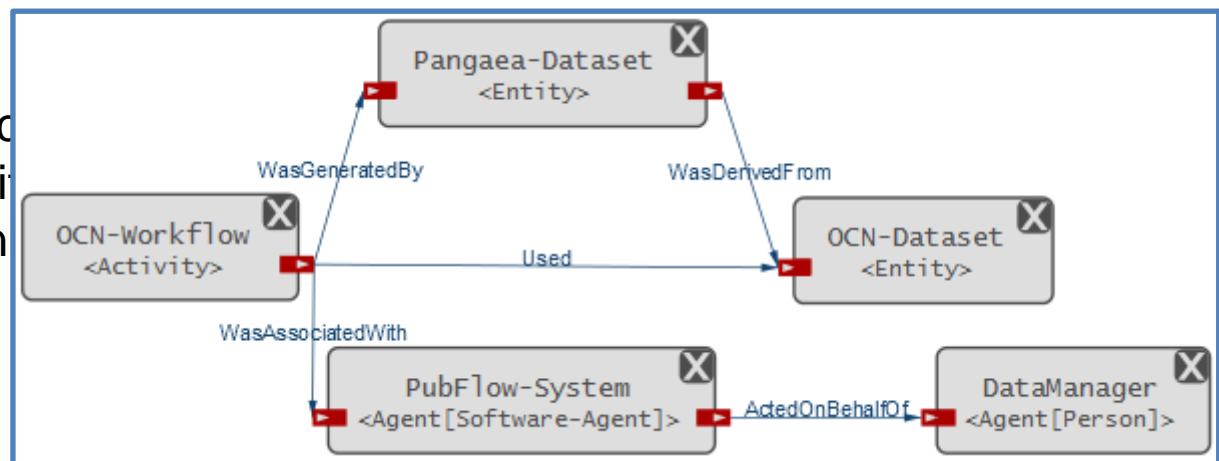
Vorgefertigte Profile

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Ausblick

Vorgefertigte Profile

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    ...
    <monitor:event type="VariableModific
        <monitor:fokus>varName</monit
        <monitor:fokus>newValue</monit
    </monitor:event>
<monitor:profile>
```



Agenda

**Vielen Dank für Ihre
Aufmerksamkeit**

