



EU H2020-ICT-2014: GA 643963



IT4RIs 2018

Interoperable infrastructure for big
data research infrastructures

Zhiming Zhao





1st IT4RIs 2015 in IEEE e-Science



Session 1: (9:00-10:30) **Interdisciplinary sciences and applications** (Zhiming Zhao)

(50) Keynote (50), Peter Wittenburg, **Data fabric and infrastructure interoperability**

(30) James Myers, ***Towards Sustainable Curation and Preservation: The SEAD Project's Data Services Approach***

Session 2: 11:00-12:30: Infrastructure services (90m, Daniele Bailo)

(30) Gary McGilvary, ***Enhanced Usability of Managing Workflows in an Industrial Data Gateway***,

(20) Regina Braga, A Semantic Peer to Peer Network to Support e-Science

(20) Paul Martin, ***Open Information Linking for Environmental Research Infrastructures***

(20) Qi Zhang, ***WIP: Provenance Support for Interdisciplinary Research on the North Creek Wetland***

(20) Antonio Giardina, ***Multi-Node Multi-Agent Cloud Simulation: Approximating Synchronization***

Session 3: (13:15-14:25) Session 3: **Interoperable infrastructure engineering** (90m, Malcolm Atkinson)

(30) Daniele Bailo, ***Interoperability oriented architecture: the approach of EPOS for Solid Earth e-Infrastructures***

(20) Patrick Huck, ***A Community Contribution Framework for Sharing Materials Data with Material Project***

(20) Zhao Zhiming, ***Reference Model Guided System Design and Implementation for Interoperable Environmental Research Infrastructures***

Session 4: (14:25-16:00) **Interoperable infrastructure and interdisciplinary sciences: challenges and future directions** (90m, Malcolm Atkinson)



1st international workshop on Interoperable Infrastructures for Interdisciplinary big Data Sciences (IT4RIs)



Dr. Zhiming Zhao



Prof. Malcolm Atkinson



Prof. Keith Jeffery

Acknowledgement



Environmental Research
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Solutions for Science and Society





2nd IT4RIs 2016 in IEEE RTSS



Session 1 (13:30-15:00) **Time critical services** in e-Infrastructures and **research infrastructures**

1. *Joao Pina*, Handling **time-critical service applications** with EGI e-Infrastructure
2. *Margareta Hellstrom*, **Near Real-time Data Processing** In ICOS RI
3. *Huan Zhou*, A Flexible **Inter-locale Virtual Cloud** For **Nearly Real-time Big Data Applications**
4. *Miguel Poeira*, An architecture for time-critical IP broadcasting in the cloud

Session 2 (15:30-17:00) **Agenda and trends** in research infrastructures

1. *Ingemar Haggstrom*, **The Real-Time challenges** for the EISCAT-3D Phased Array Radar system
2. *Zhiming Zhao*, **Time critical requirements** and technical considerations for advanced support environments for data-intensive research
3. Panel discussion Joao Pina, Margareta Hellstrom, Huan Zhou, Miguel Poeira (Alexandre Ulisses) and Sebastian Altmeyer, Zhiming Zhao (Moderator)
4. Wrap up

Nov 28, 2016, Porto, 2nd International Workshop on (<https://staff.fnwi.uva.nl/z.zhao/workshop/it4ris/>)
Interoperable infrastructures for interdisciplinary big data sciences (IT4RIs 16), RTSS 2016

Theme: nearly real time data processing and time critical cloud applications



Zhiming Zhao



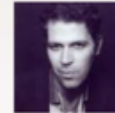
Sebastian Altmeyer



Keith Jeffery



Malcolm Atkinson



Alexandre Ulisses

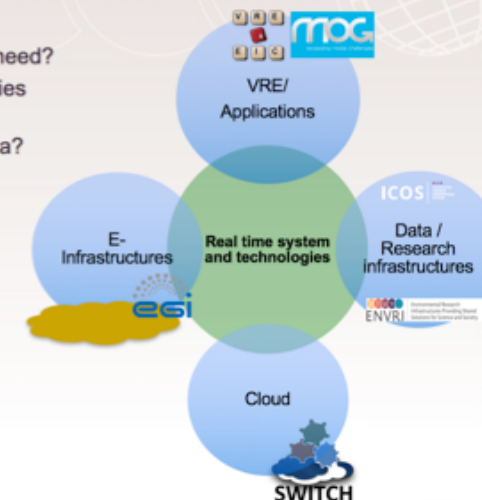


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Panel discussion

- What do VRE/RI/E-Infra need?
- What real-time technologies can be used?
- What are the R&D agenda?





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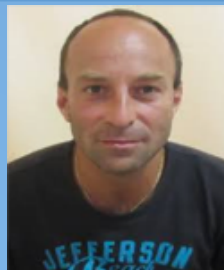


3rd IT4RIs 2018

Interoperable infrastructure for big data research infrastructures



Zhiming Zhao



Radu Prodan



Keith Jeffery



Alexandre Ulisses



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Sessions



- **Session 1 (9:00-10:40): Time critical cloud computing: Software engineering challenges in cloud applications (Zhiming Zhao)**
- **Session 2 (11:00-12:30): Infrastructure optimization for data intensive applications- (Radu Prodan)**
- **Session 3: (13:30- 15:00) Security and AAI challenges and solutions in RI and VRE (Jacco van Ossenbruggen)**
- **Session 4: (15:30-17:00) From Cloud computing, digital infrastructures and open data market to EOSC (Zhiming Zhao)**
- **Session 5: (17:00- 19:30) Demo and poster (George Suciu Jr.)**
- **Reception 17:30- 19:30**



3rd IT4RIs 2018 in HPC



- **Session 1 (9:00-10:40): Time critical cloud computing: Software engineering challenges in cloud applications (Zhiming Zhao)**
 - *Polona Štefanič*, 10', TOSCA-based SWITCH Workbench for application composition and infrastructure planning of time-critical applications
 - *Louise Knight*, 10', Towards a Methodology for Creating Time-critical, Cloud-based CUDA Applications
 - *Huan Zhou*, 10', CloudsStorm: An Application-driven DevOps Framework for Managing Networked Infrastructures on Federated Clouds
 - *Sandi Gec*, 10', QoS-Aware Orchestration in the SWITCH environment
 - Panel discussion (40')
 - Title: Time critical cloud computing: gaps and future direction
 - Moderator, Zhiming Zhao,
 - Panelists: Guadalupe Flores, George Suci, Guadalupe Flores, Pedro Santos, Vlado Stankovski, Andrew Jones,
 - *Zhiming Zhao*, 5' SWITCH: challenges, approach and achievements
 - Industrial short talks: (5'*3): use case, challenges, achievements and wishes
 - BEIA: Real-Time Telemetry System for Emergency Situations using SWITCH
 - MOG: Cloud studio for live event broadcasting
 - WT: Collaborative Real-Time Business Communication Platform

Q2: GUI for enabling cooperative: development, provisioning, and control of time critical applications

Q1: Information model and semantic linking: QoS/QoE/application logic/Cloud/etc.

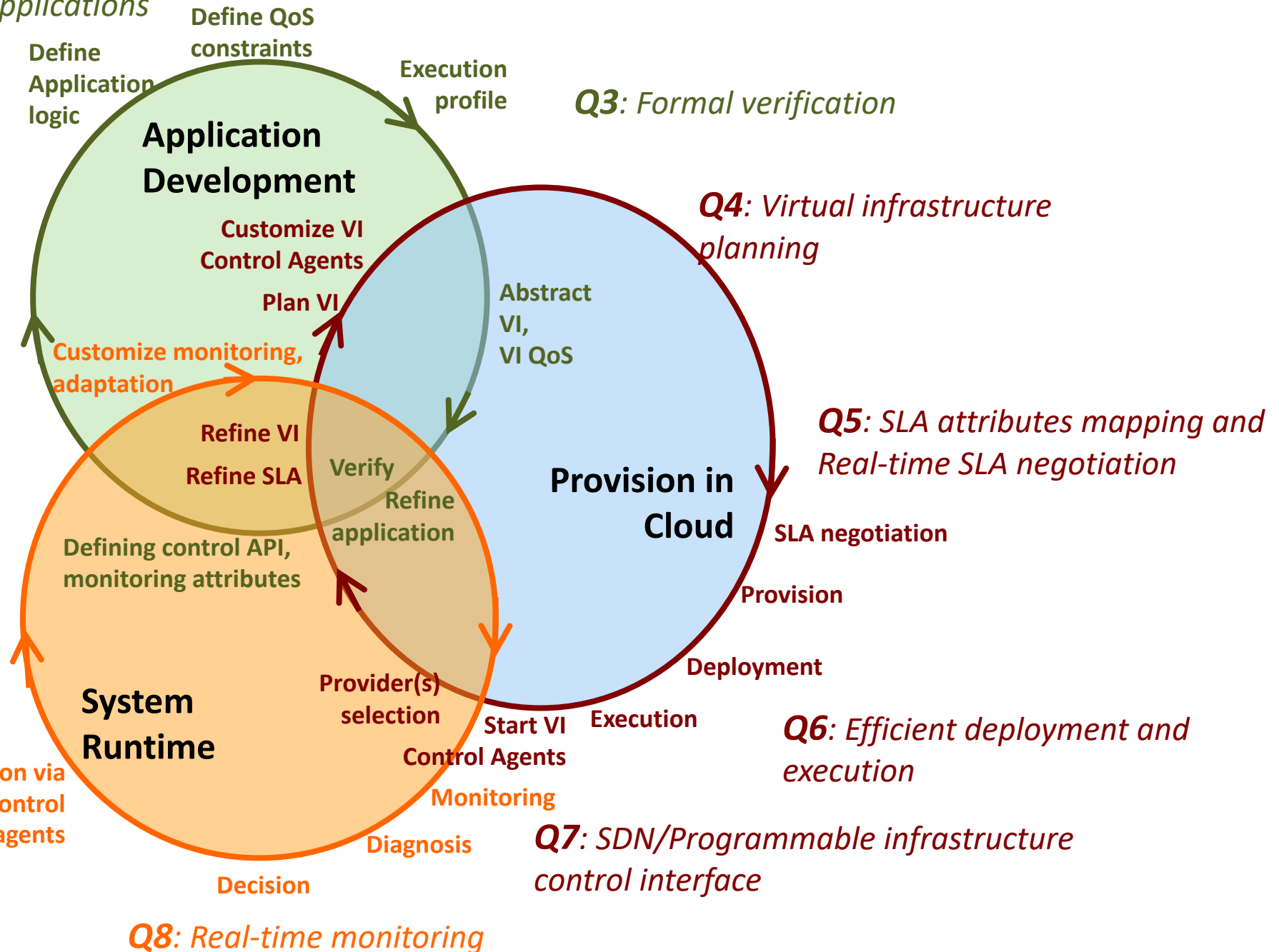
Q13: Architecture, Integration interface and release

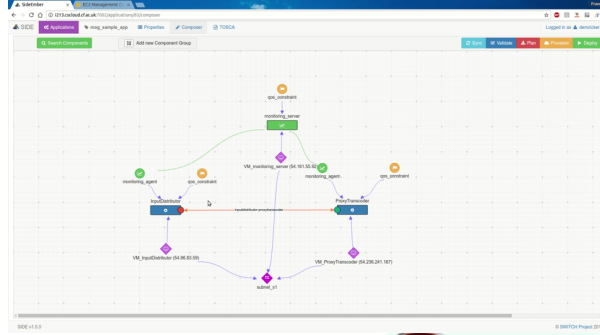
Q12: Knowledge base for SWITCH

Q11: Self-adaptive and learning

Q10: Run-time system reconfiguration and adaptation

Q9: Performance diagnosis and prediction





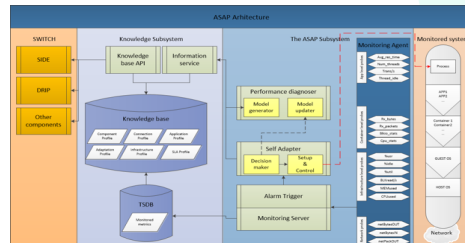
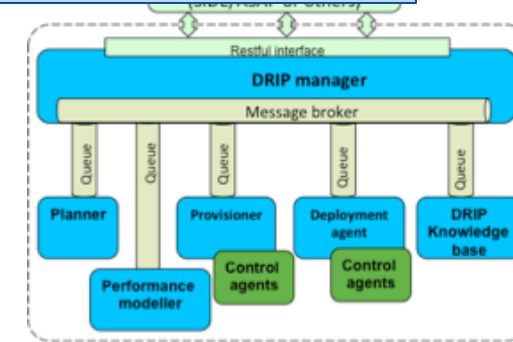
Multi view GUI

- Program application logic + virtual infrastructure
- Integration with DRIP/ASAP for provisioning and runtime control



Opensource, Apache

<https://github.com/switch-project/SWITCH>



Resource providers

Application & QoS requirements

Formal verification

Abstract infrastructure

Workbench

- Time critical cloud applications
- Interactive
- Self-adaptive
- Dev-Prov-Ops

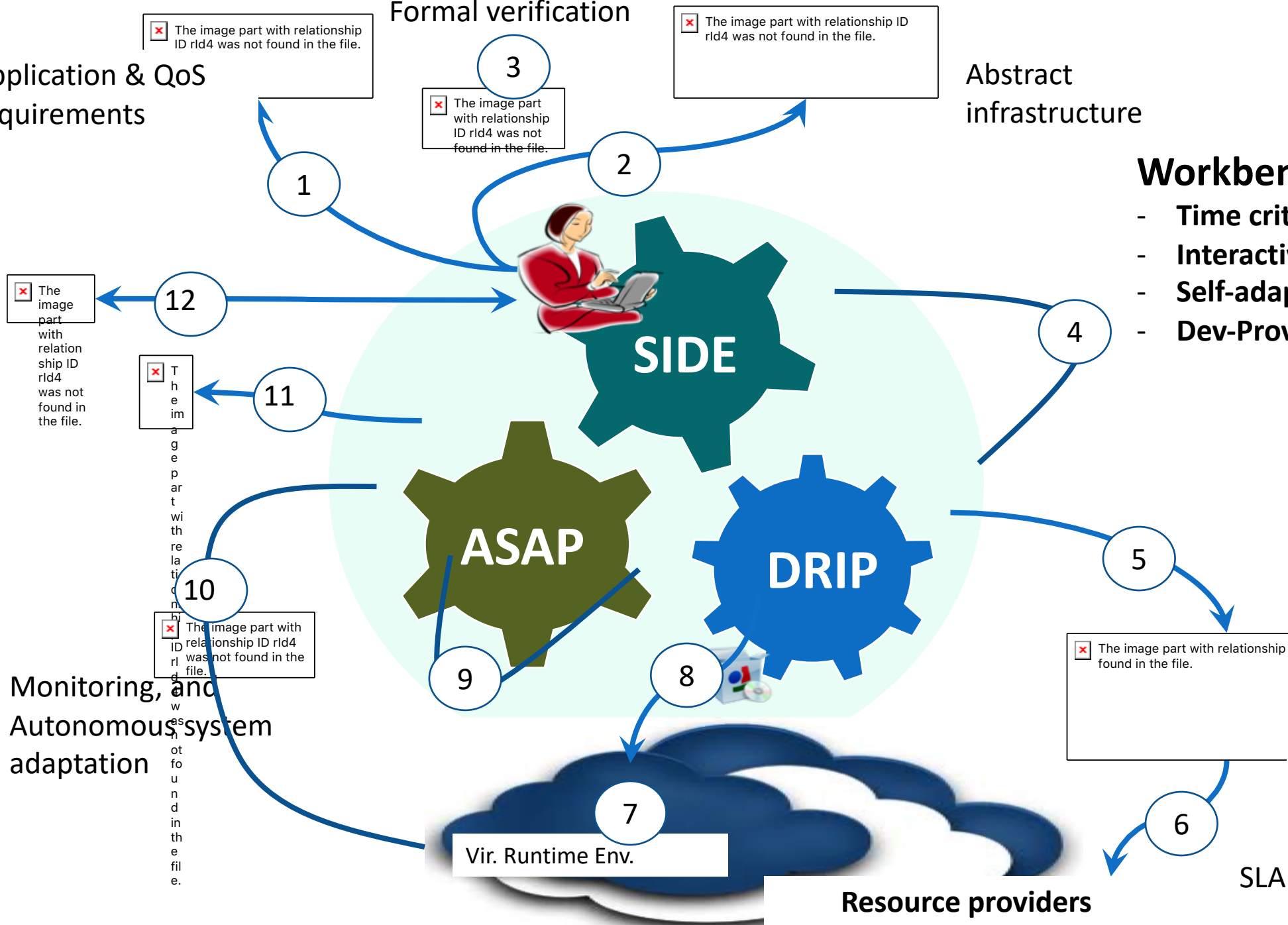
Planned virtual infrastructure

SLA

Resource providers

Vir. Runtime Env.

Monitoring, and Autonomous system adaptation





Session 1: Panel discussion



Case presentations: challenge and expectation

- Live event broadcasting, (Pedro Santos)
- Business collaboration, (Guadalupe Flores)
- Disaster early warning, (George Suciu)

Discussion: Time critical cloud computing: gaps and future direction

- **Why** is time-critical cloud computing so **important** to your field?
- What are the main **challenges** for time-critical cloud computing that you feel most technology providers in the field are **not addressing** at present?
- **How** do you think these challenges **can/should be addressed**?
- What do you see as the **future** for **time-critical cloud computing**?
- **Questions from audience**

- The report will be available after the workshop
- FGCS Special issue for “**time critical applications on software defined infrastructure**”
 - Deadline: 15/April 2018
- www.switchproject.eu

<https://www.journals.elsevier.com/future-generation-computer-systems/call-for-papers/special-issue-on-time-critical-applications-on-software-defi>

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Special issue on “Time-critical applications on software defined infrastructure”

Background

Time-critical applications are industrial and scientific applications with strict, often real-time performance requirements, typically expressing constraints on the Quality of Service (QoS) (e.g. response time upon detection of a tsunami event) or Quality of Experience (QoE) (e.g. delivery of ultra-high definition video to content distributors) prior to their users. Such applications often involve distributed components between which large volumes of data must reliably be transferred. Example applications which provide early disaster warning often



3rd IT4RIs: session 2



- **Session 2 (11:00-12:30): (Use cases/ENTICE) Infrastructure optimization for data intensive applications- (Radu Prodan)**
 - Radu Prodan, 15', Introduction to ENTICE
 - David González, 30', Payload Data Ground Segment in Cloud for Earth Observation Satellites with the Entice Middleware
 - Guadalupe Flores Salado, 15' ENTICE business benefits to a Cloud Soft Provider Company
 - Nishant Saurabh, 15', Optimized VMI Storage and Distribution in Federated Cloud Environment
 - Sandi Gec, 15', Semantics for the Cloud: The ENTICE integrated environment and opportunities with smart contracts

- **Session 3: (13:30- 15:00) Security and AAI challenges and solutions in RI and VRE (Jacco van Ossenbruggen)**
- **Presentations:**
 - Alessandro Paolini:
 - Ralph Koning: Measuring the efficiency of SDN mitigations against cyber attacks
- **Panel discussion:**
 - Moderator: Jacco van Ossenbruggen
 - Panelists: Mark Santcroos (LUMC), Franciska de Jong (CLARIN), Alessandro Paolini (EGI)
 - Topic: Research Infrastructure Policies and their Implementation.

- **Session 4: (15:30-17:00) (Future challenges, strategy and agenda)**
From Cloud computing, digital infrastructures and open data market to EOSC (**Zhiming Zhao**)
 - Malcolm Atkinson, 20'- Pushing the limits for data-powered research
 - Cees de Laat, 20', Open Data market
 - Yannick 20', EOSC and future vision
- Panel discussion (30')
 - Title: What is the best strategy for data-powered research?
 - Moderator: Zhiming Zhao
 - Panelists: Malcolm Atkinson, Yannick Legré, Wouter Los, Cees de Laat

1. What are the main **barriers** preventing researchers from using data **effectively**?
2. What do we need to **build** if we want to enhance researchers' data science **capabilities**?
3. How do we encourage researchers to make more **effective** use of the **resources** currently available for data-powered research?
4. In a few words, what is your vision for the **future** of data science?