Challenges on software engineering for services and applications

Cluster on Software Engineering for Services and Applications

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The cluster on Software Engineering for Services and Applications (SE4SA)

- Group of EU project focusing on software engineering for
  - Services, Cloud-based applications, IoT, Big data

Aligned	AppHub	ARCADIA	ARTIST	CloudTeams	CloudWave	DECIDE	DICE	DITAS
ElasTest	ENTICE	Envisage	HyVar	MODAClouds	MONDO	OpenReq	Prowess	Q-Rapids
RISCOSS	SeaClouds	S-CASE	STAMP	Supersede	SWITCH	TANGO	U-QASAR	

- https://eucloudclusters.wordpress.com/software-engineering-for-services-and-applications/

Why software engineering is important

- Software is everywhere and our society is now totally dependent on software-intensive systems

... But...

- Software is intangible
- It is difficult to distinguish it from the devices it has been built for
  - It seems to be a minor part of it
- Thus...
  - Often developed by domain specialists rather than software engineers
  - Leading to a number of critical failures

So, we need to

- Increase the number of software engineers
- Increase software engineering competencies in non-software engineering specialists
- Provide the right tools and methods to support all phases of the (DevOps) software life-cycle, to increase productivity and quality
- Identify the right development, quality assurance and operation paradigms and tools for the core infrastructural software for Cloud, IoT, CSP, Big data

Cluster objectives and current outcomes

- Identify complementarities, synergies, possibilities for collaboration/results adoption between projects

  - White paper to map the contributions of all projects, published in the proceeding of CloudForward 2016

  - Directory of researchers available to participate to advisory boards

- Identify new challenges and trends to influence the European research agenda

  - List of challenges derived from open discussions and questionnaires

- Organise common dissemination (publications, training and workshops)

  - Cloud Expo 2015, special session at ICT 2015, common booth at NetFuture 2016, discussion forum at CloudForward 2016, participation in key workshops and events

  - Common demo and training events (planned)

Examples of some of our (more mature) projects and activities

Switch Objectives

SWITCH

- Addresses
  - the entire life-cycle of time-critical self-adaptive applications
- Will develop new middleware and front-end tools for
  - specifying time-critical requirements (SIDE)
  - deploy the applications (DRIP)
  - monitor and adapt the infrastructure according to changing requirements (ASAP)
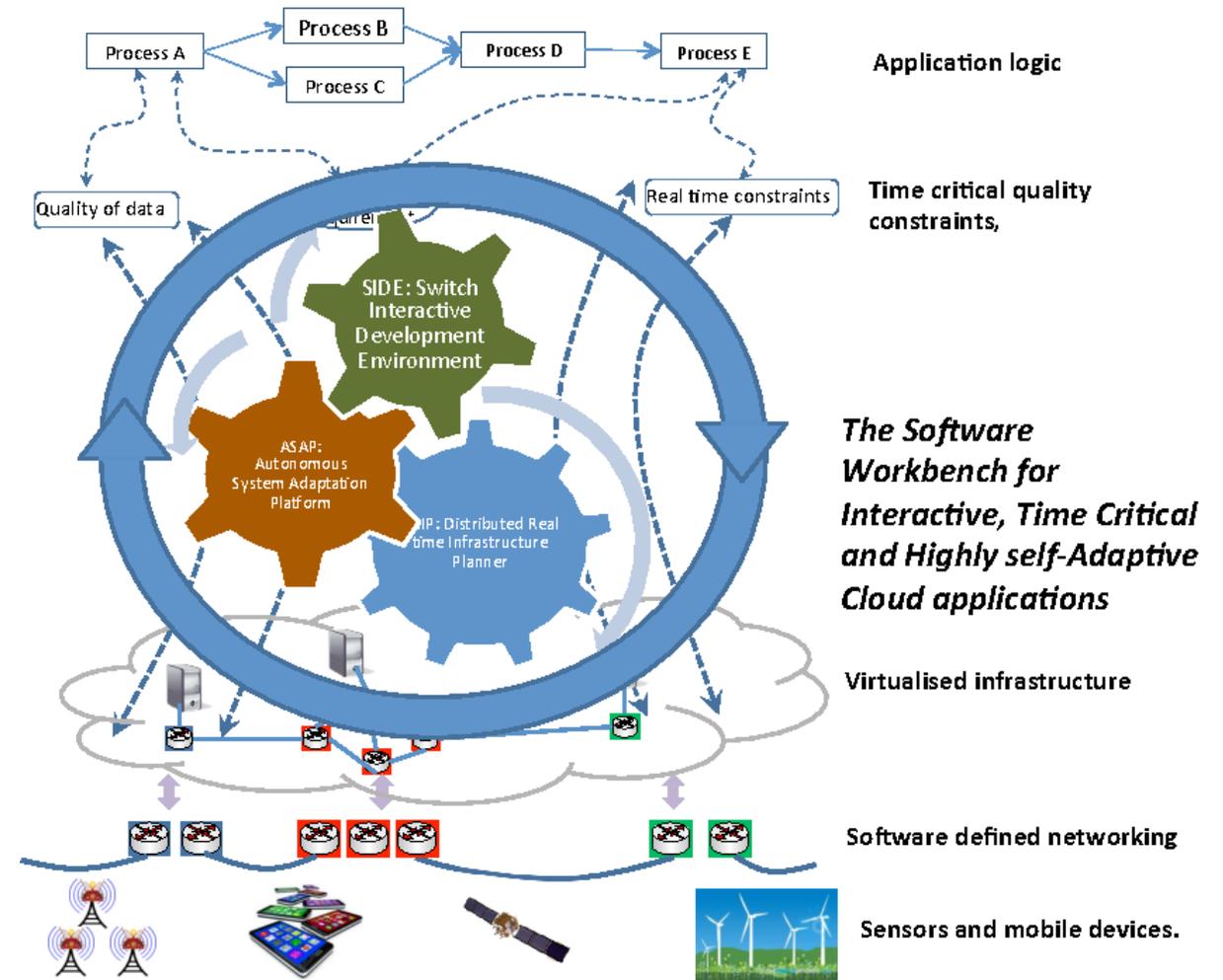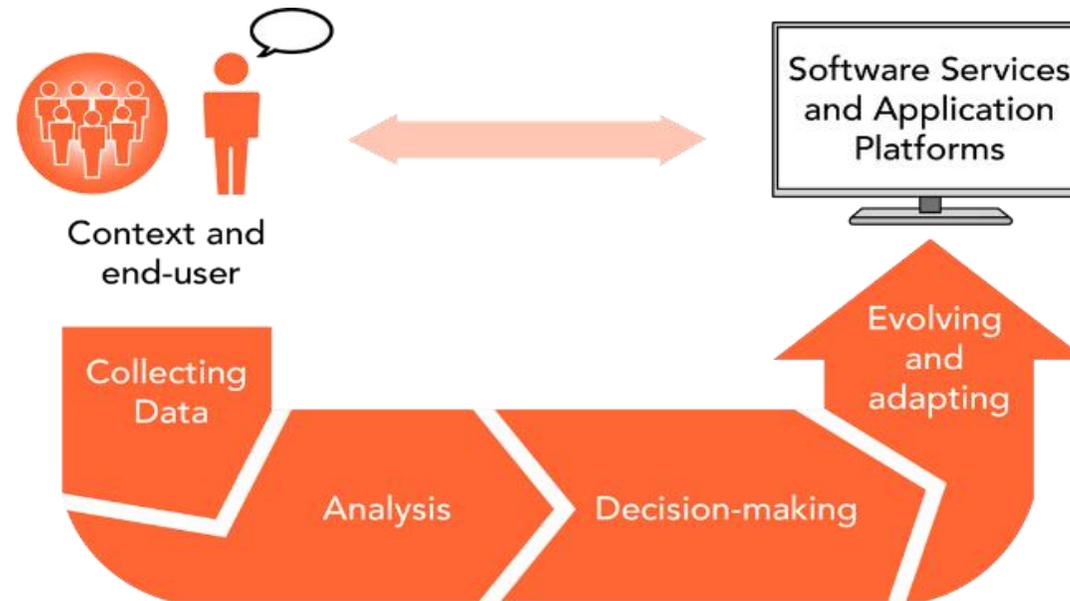
Switch and cluster participation at Cloud Expo 2015

Figure 1: Our Stand at Cloud Expo 2015

SUPERSEDE

SUPERSEDE provides methods and tools to support **decision-making** in the **evolution and runtime adaptation of services and applications** based on **user's feedback and contextual data**
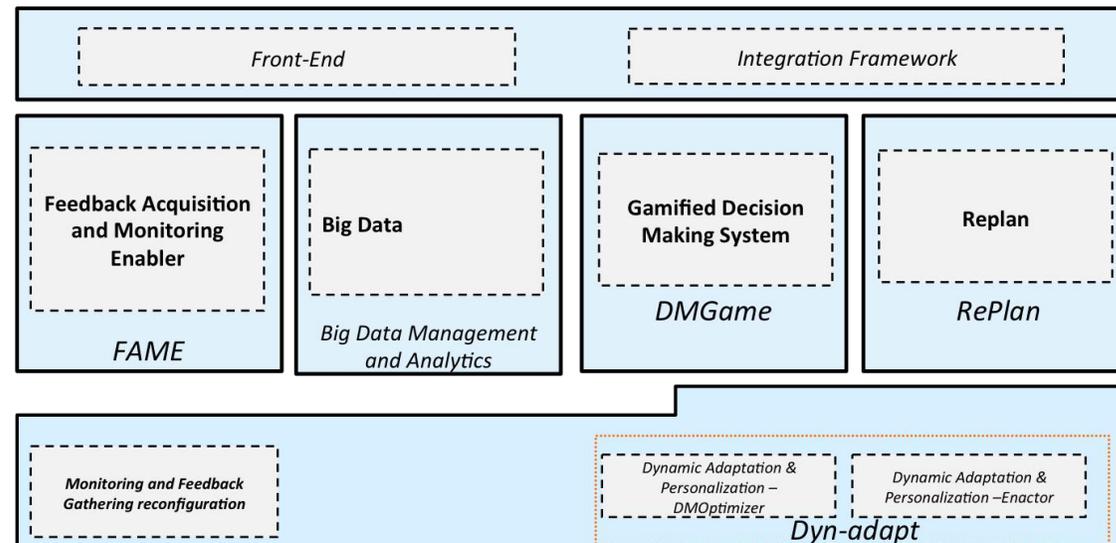
SUPERSEDE IN Se4Sa

Contribution so far:

- Organization of **webinars for the dissemination** of the different results (techniques and tools) in the cluster projects
- Promote the **connection with specific methods and tools developed in other projects** in the cluster

SUPERSEDE

Se4Sa Webinars 1/2

- For instance, SUPERSEDE would like to disseminate methods and to **support feedback- / data-driven**:
    - **Evolution** of software systems
    - **Dynamic adaptation** of software systems

- Webinar's attendee will be invited to give their feedback filling in a survey

Front-End		Integration Framework	
Feedback Acquisition and Monitoring Enabler	**Big Data**	**Gamified Decision Making System**	**Replan**
FAME	*Big Data Management and Analytics*	*DMGame*	*RePlan*

Monitoring and Feedback Gathering reconfiguration

Dynamic Adaptation & Personalization – DMOptimizer *Dynamic Adaptation & Personalization –Enactor*

Dyn-adapt

- available for download at: https://github.com/supersede-project

- The SUPERSEDE tool-suite is available at: http://platform.supersede.eu:8080/#/

SUPERSEDE

Se4Sa Webinars 2/2

- So far 5 projects gave availability to organise / attend webinars between September and November 2017

SUPERSEDE

# SUPERSEDE & RISCOSS:
synergies in the cluster

RISCOSS: Risks and Costs of Open Source Software Adoption

Two main aspects

- **Analysis of the characteristics of the components** used in SUPERSEDE – e.g., the compatibilities of their licenses

- Use of the **risk modelling and analysis techniques** specified in RISCOSS as part of the **portfolio of decision-making techniques** of SUPERSEDE

HyVar - Scalable Hybrid Variability
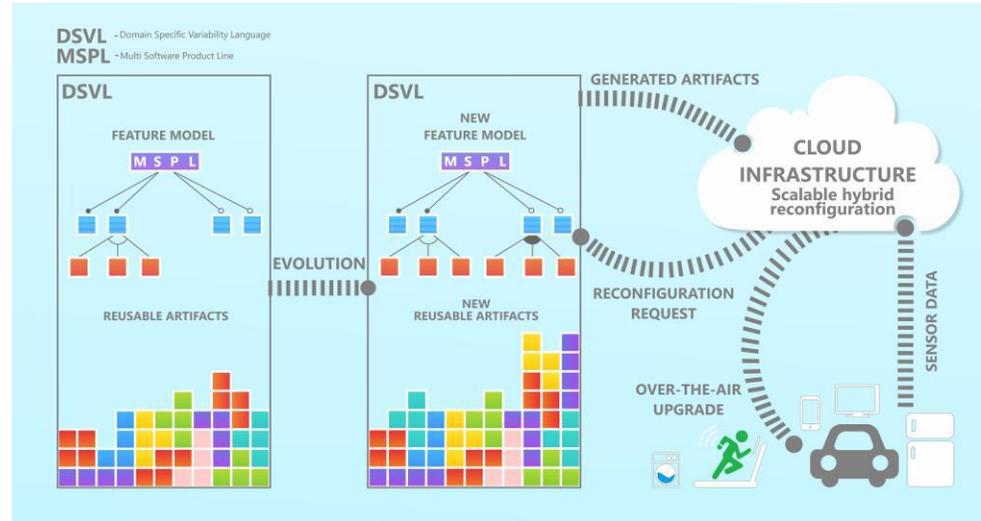
- Model Software Product Lines (SPLs) for similar end devices (e.g. cars) with statecharts and deltas on statecharts (delta-oriented modeling).

- Generate code for end devices based on statecharts and linked code artifacts.

- End devices send updates of their sensor data to the cloud (e.g., new GPS position).

- Cloud incorporates end device data and external data (e.g., the weather) to new context.

- In the cloud, the generation of the new software variant based on the new configuration is triggered.

- The end device is updated with the new variant by the cloud.

HyVar - participation to SE4SA cluster

- HyVar participated to the SE4SA cluster activities since 2015.
- We found very useful the opportunity to:
  - Discuss with other expert in order to identify new research directions and challenges.
  - Identify synergies and opportunities for collaboration among projects.
- We contributed to the white paper on "Current and Future Challenges of Software Engineering for Services and Applications"
  - The paper summarizes the results of discussions held in clusters meetings and of a survey collecting feedback from projects.
  - It was published on Cloud Forward 2016 Proceedings
- We also were present at the NetFutures 2016 booth and at the Expert Workshop "Challenges & Opportunities for the European Software Industry", October 6 2016.
- We would like to further contribute in:
  - Write a position paper about SW technologies beyond H2020
  - Organize common dissemination activities.

Available online at www.sciencedirect.com

ScienceDirect

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Procedia Computer Science

CLOUD FORWARD: From Distributed to Complete Computing, CF2016, 18-20 October 2016, Madrid, Spain

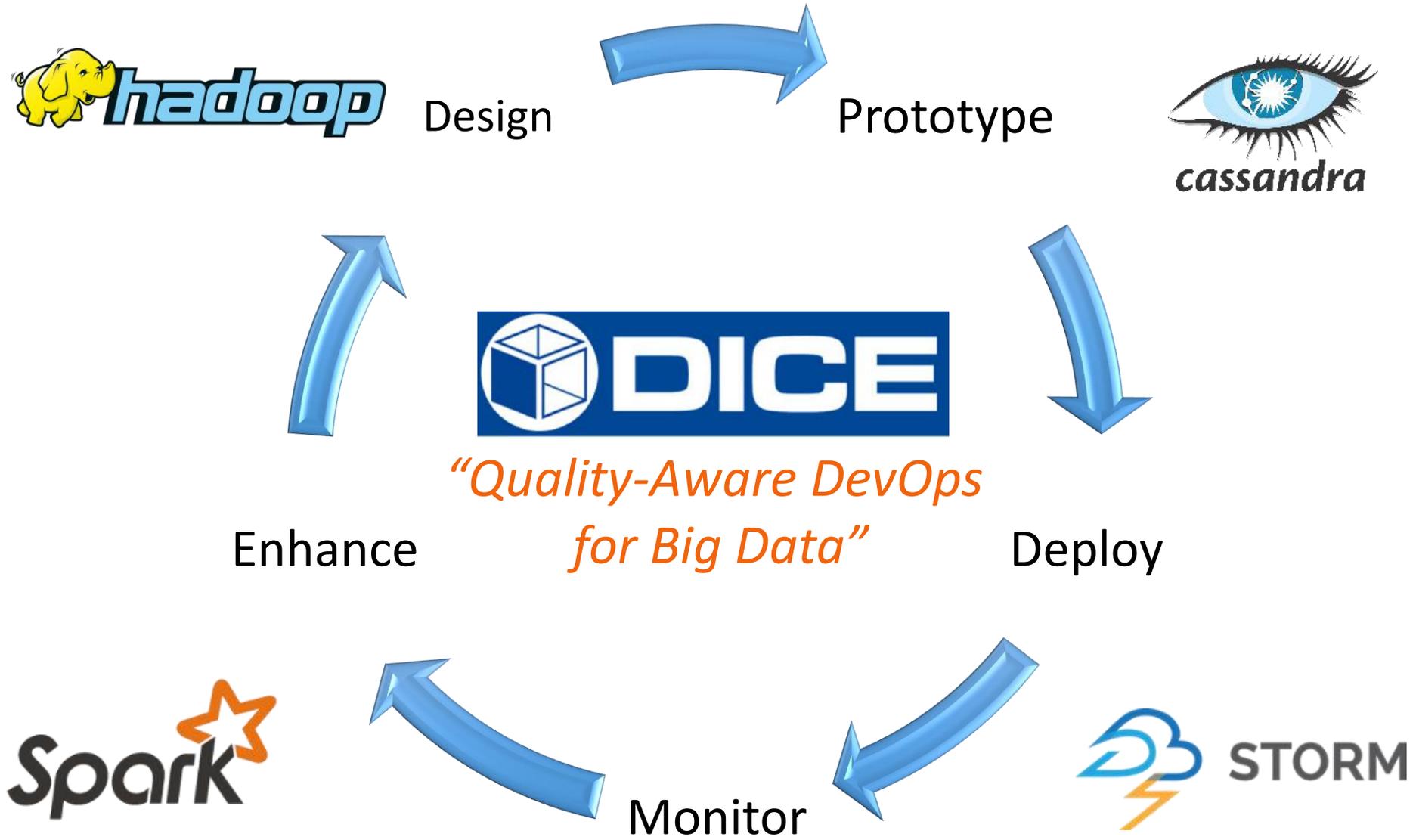## Current and Future Challenges of Software Engineering for Services and Applications

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[a]Cluster of Europen Projects on Software Engineering for Services and Applications
https://eucloudclusters.wordpress.com/software-engineering-for-services-and-applications/

http://www.sciencedirect.com/science/article/pii/S1877050916320944

DICE: Quality-Aware DevOps for Big Data

Design → Prototype → Deploy → Monitor → Enhance

"Quality-Aware DevOps for Big Data"

Our plan for next steps in the cluster

- Maintain the role of aggregator among projects
- Act as a catalyst and enabler for
  - the identification of new dissemination and cooperation ideas
  - classification of problems being addressed
  - identification of new challenges
- Write joint publications
- Influence the future research agenda
- Create exploitation opportunities

Today breakout session (15.30 – 17.30)

- Room River 1
- Agenda
  - Round table presentation of projects
  - Presentation of the outcome of the last analysis survey
  - Plan for forthcoming demo and tutorial events
  - Discussion about the internal organization of the cluster
    - Governance rules and assignment of responsibilities
  - Agenda for the new six months