

# Challenges on software engineering for services and applications

Cluster on Software Engineering for Services and Applications

June 28<sup>th</sup> 2017

Elisabetta Di Nitto, Carmen Bobeanu, Angelo Susi,  
Anna Perini, Cristina Chesta

# 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

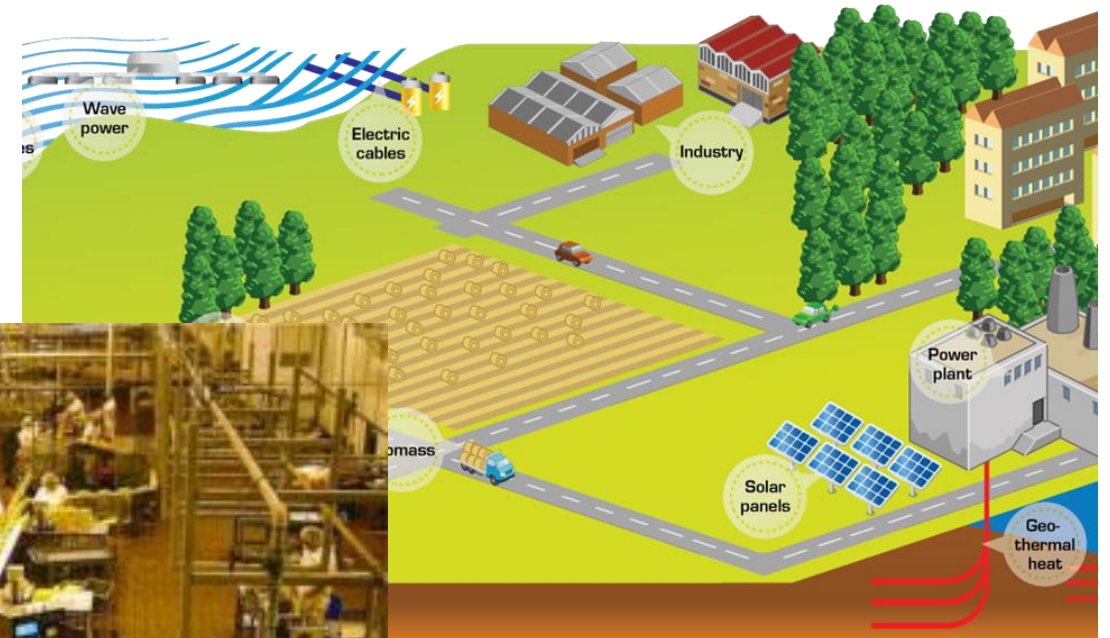
Aligned	AppHub	ARCADIA	ARTIST	CloudTeams	CloudWave	DECIDE	DICE	DITAS
ElasTest	ENTICE	Envisage	HyVar	MODAClouds	MONDO	OpenReq	Prowess	Q-Rapids
RISCOSS	SeaClouds	S-CASE	STAMP	Supersede	SWITCH	TANGO	U-QASAR	

- <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)

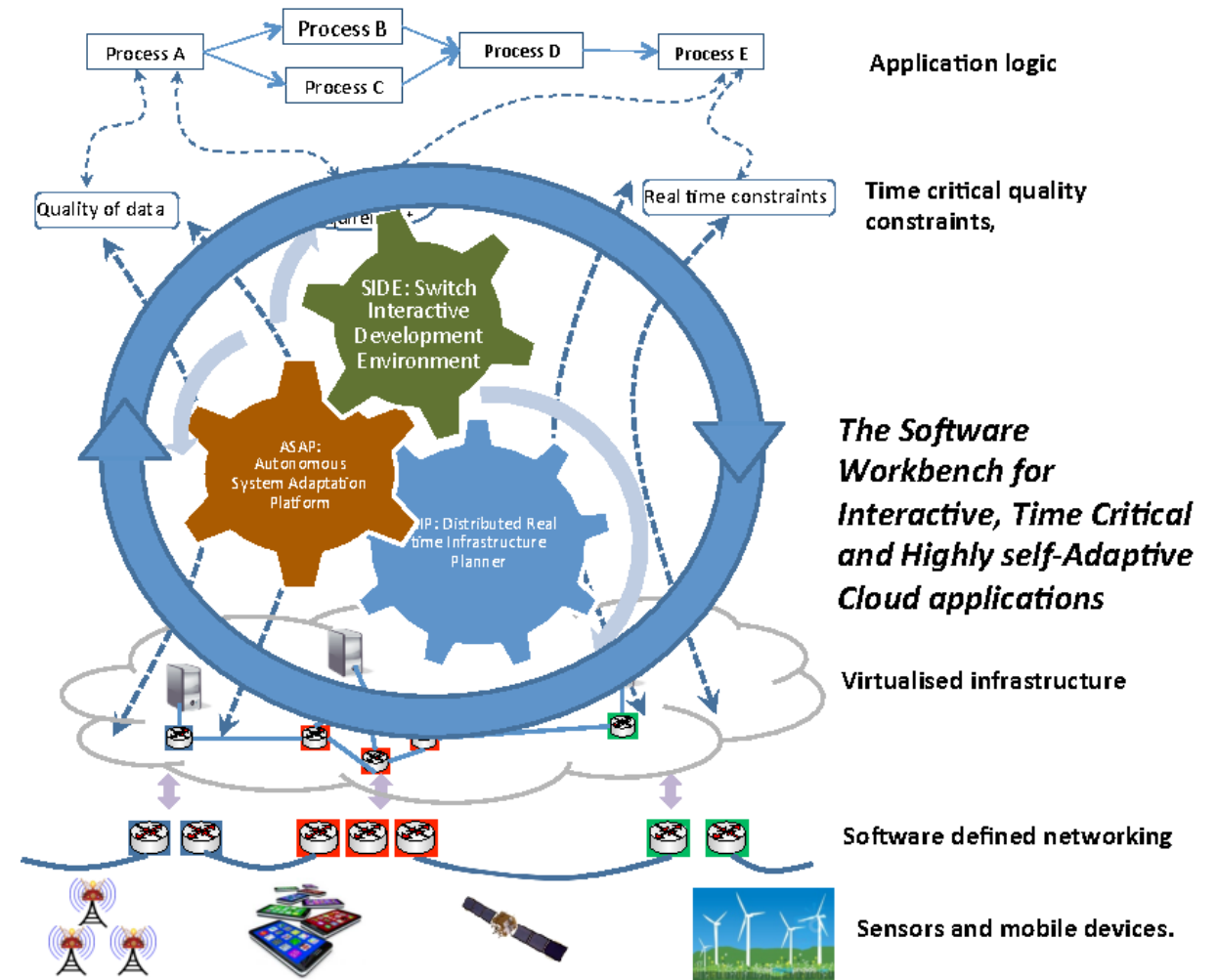
Examples of some of  
our (more mature) projects and  
activities

# 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)



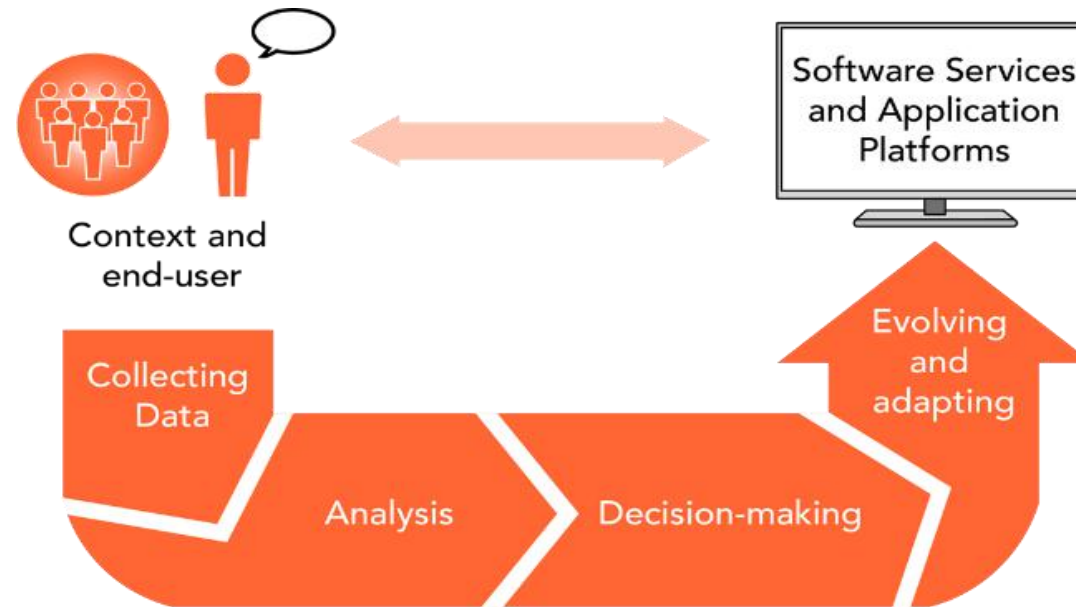


# Switch and cluster participation at Cloud Expo 2015



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**

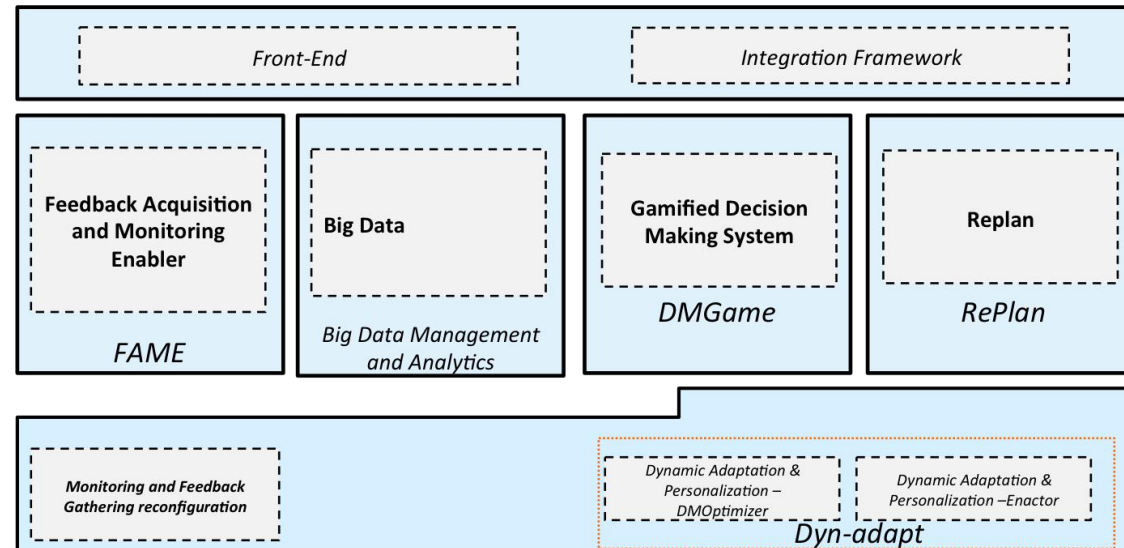
# SUPERSEDE IN Se4Sa

## 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

# 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



- available for download at:  
<https://github.com/supersede-project>
- The SUPERSEDE tool-suite is available at:  
<http://platform.supersede.eu:8080/#/>

# Se4Sa Webinars <sup>2/2</sup>

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

# SUPERSEDE & RISCOSS: *synergies in the cluster*

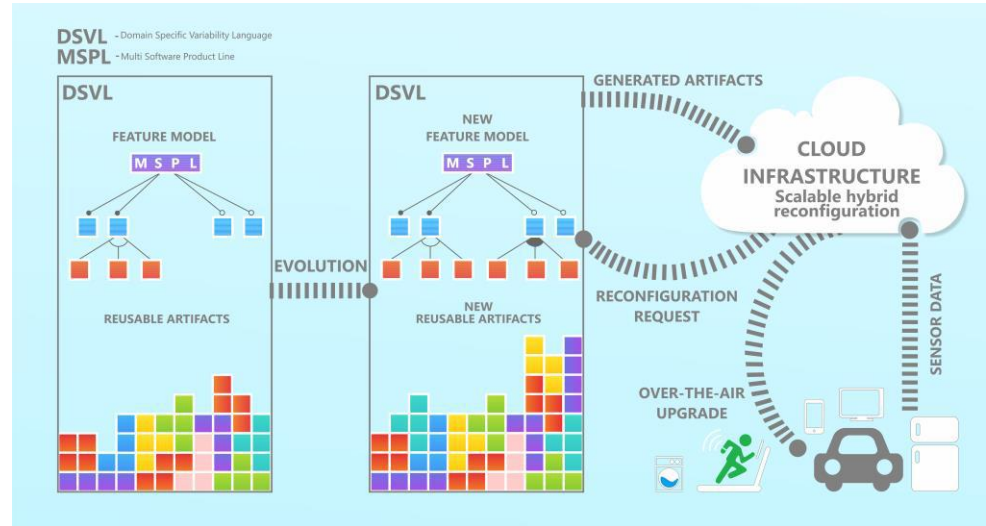
RISCOSS: Risks and Costs of Open Source Software Adoption

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.



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

Giuliano Casale<sup>a</sup>, Cristina Chesta<sup>a</sup>, Peter Deussen<sup>a</sup>, Elisabetta Di Nitto<sup>a,\*</sup>, Panagiotis Gouvas<sup>a</sup>, Sotiris Koussouris<sup>a</sup>, Vlado Stankovski<sup>a</sup>, Andreas Symeonidis<sup>a</sup>, Vlassis Vlasiou<sup>a</sup>, Anastasios Zafeiropoulos<sup>a</sup>, Zhiming Zhao<sup>a</sup>

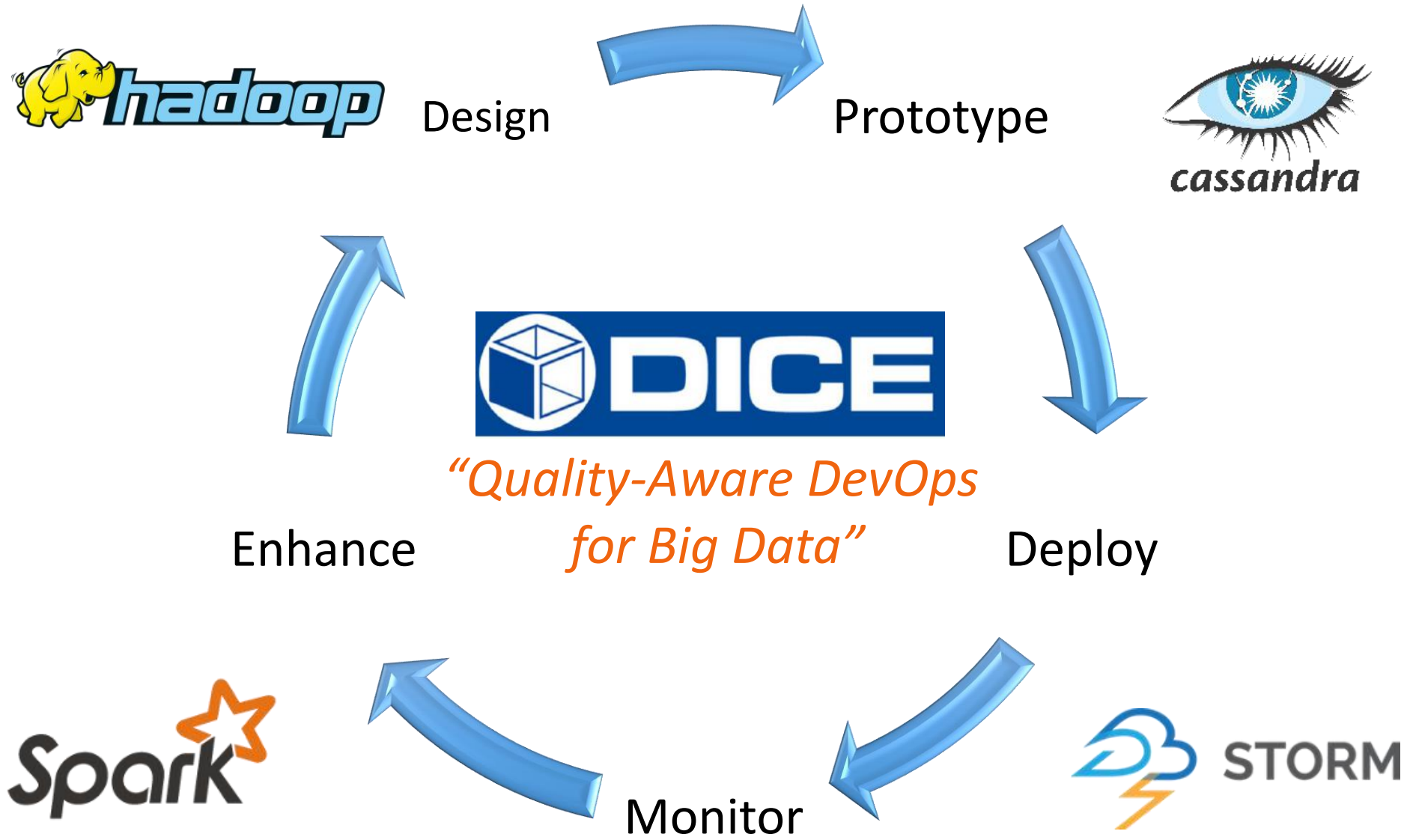
\*Cluster of European Projects on Software Engineering for Services and Applications  
<https://eucloudclusters.wordpress.com/software-engineering-for-services-and-applications/>

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





# DICE: Quality-Aware DevOps for Big Data



# 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

