



# Cluster on Inter-cloud Challenges, Expectations and Issues

## \* Topics for the Horizon 2020 ICT Work Programme 2018 - 2020

Ana Juan Ferrer, ATOS & Cluster Chair



Vendor lock-in for existing adopters

Issues: Lack of interoperability, regulatory context, SLAs....

Inter-Cloud: Hardly automated, lack of diversity of resources, overall service management

**Hybrid IT Model:**  
Vertical markets specialisation  
customisation  
Product centric to service centric  
Outsourcing of not critical business processes  
Providers specialisation

**Hybrid Cloud:**

Standards emergence

Interoperability

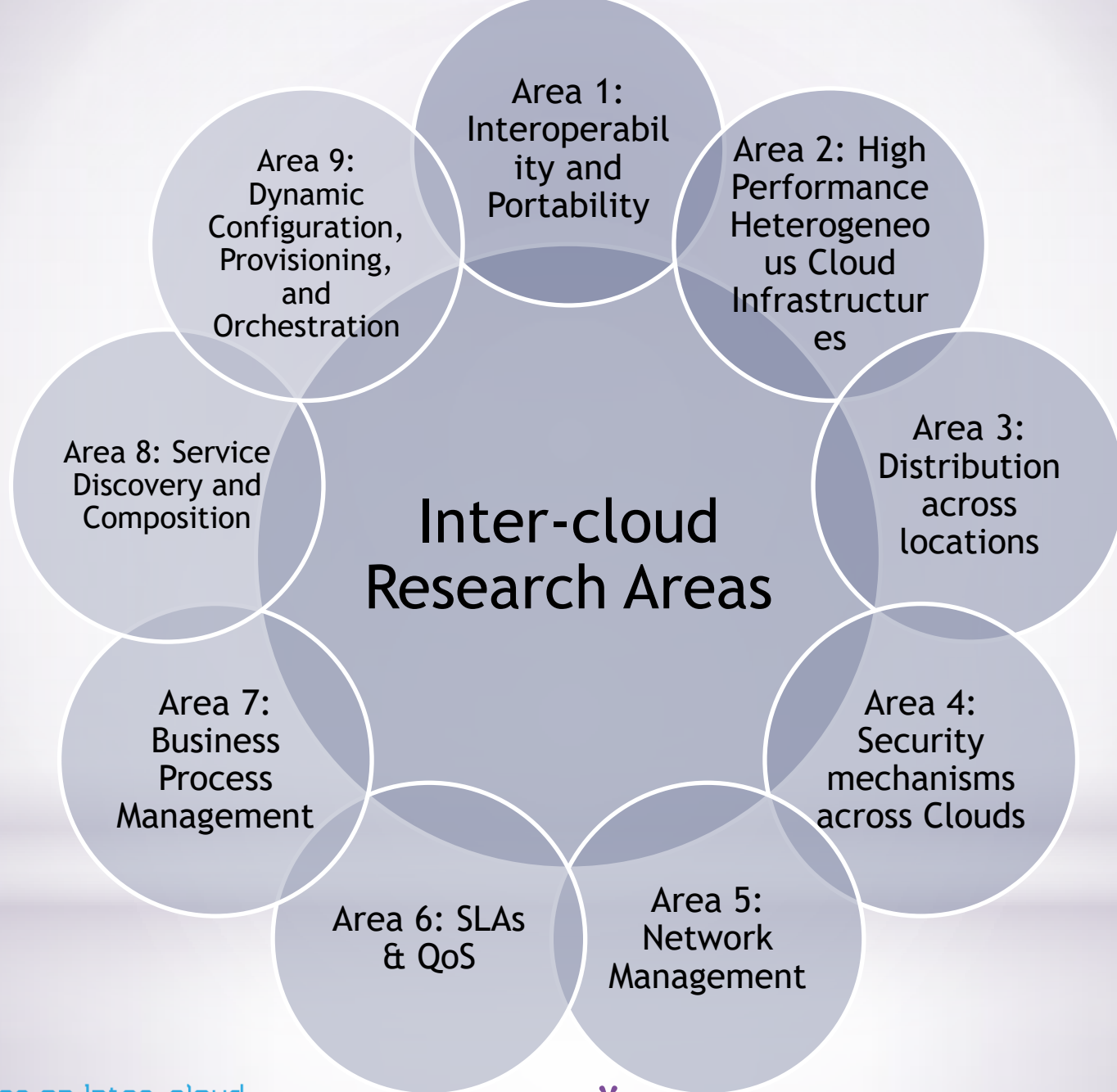
workload portability across diverse cloud models

Exploit multi-cloud to full potential  
dynamicity & runtime adaptation

**Hybrid Inter-Cloud Model:**  
Decentralisation  
Hyper distribution of computing across cloud typologies and models  
Real autonomic inter-cloud decentralised layer, workload keystone

Cluster on Inter-cloud  
Challenges, Expectations  
and Issues

\* Vision for 2020



\* **Identified Research Areas**



## Challenges Area 1: Interoperability and Portability

5	Challenge 2. Switch services among cloud typologies and providers without efforts
4	Challenge 1. Develop once deploy everywhere
4	Challenge 3. Interoperability to cope with Cloud heterogeneity and application mobility
4	Challenge 6. Universal Semantic Service Description
3	Challenge 4. Automatic migration of in house application to the Cloud and across cloud typologies.
2	Challenge 5. Extended Workload Portability

## Challenges Area 2: High Performance Heterogeneous Cloud Infrastructures

5	Challenge 2. Monitor and guarantee inter-cloud infrastructure SLAs performance
4	Challenge 4. New languages to express overall high performance including storage, compute, network
3	Challenge 5. Dependability and reliability between Cloud providers and consumers
2	Challenge 3. Dynamic workload balancing in multi-cloud context
1	Challenge 1. Enable with inter-Cloud Service Provider connectivity

## Challenges Area 4: Security Mechanisms Across clouds

5	Challenge 5. Auditability in Cloud Federated Cloud Networks
4	Challenge 1. Security mechanisms for application integrity
4	Challenge 4. Definition of Security and network-aware application requirements
2	Challenge 2. Federated Authentication for non-Browser HTTP Applications
2	Challenge 3. Federated Authorization Policies and Use Cases

## Challenges Area 5: Network Management

4	Challenge 2. To guarantee new paths for optimizing transfer of data among clouds, among IoTs and clouds-IoTs
3	Challenge 1. Extension to Cloud Federation concept and tools
3	Challenge 3. Enablement of responding more fluidly to changes in user demand at inter-cloud level but also at the edge level
1	Challenge 4. DevOps Agile development and deployment considering network management

### Challenges Area 3: Distribution across locations for reducing latency, address legal constraints and enable high availability

- |   |   |
|---|---|
| 2 | Challenge 3. Novel High Availability mechanism across hybrid cloud models |
| 2 | Challenge 4. Legal aspects  |
| 2 | Challenge 1. Scalability across clouds based on demand                    |
| 1 | Challenge 2. Cross-cloud VM/container image distribution SLAs             |

### Challenges Area 6: SLAs & QoS

- |   |   |
|---|---|
| 5 | Challenge 3. Intelligent Broker                                 |
| 4 | Challenge 1. SLA Standard Representation                        |
| 4 | Challenge 2. Monitoring of QoS and application level monitoring |
| 4 | Challenge 4. SLA-based cloud service/application management     |

### Challenges Area 7: Business Process Management

- |   |   |
|---|---|
| 4 | Challenge 2. Cross-layer and Scalable Multi-Cloud Workflows and BPaaS         |
| 4 | Challenge 1. Smart business-to-IT alignment.                                  |
| 3 | Challenge 6. Flexible Cost Models   |
| 2 | Challenge 5. Smart Business Intelligence through cross-layer BPaaS Evaluation |
| 2 | Challenge 3. Cross-layer BPaaS Monitoring & Adaptation                        |
| 2 | Challenge 4. Intelligent Allocation of BPaaS across cloud levels              |

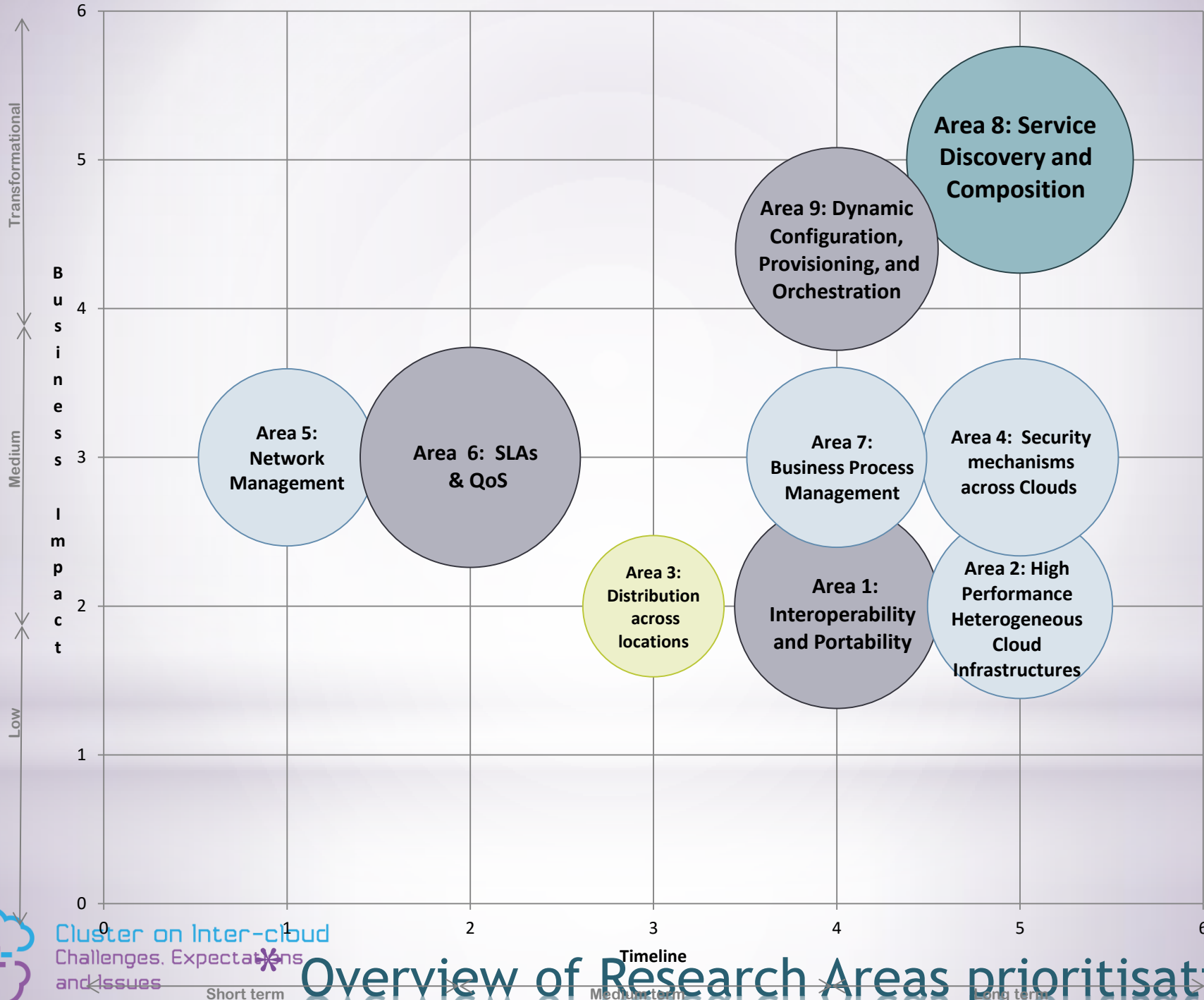
## Challenges Area8: Service Discovery & Composition

- |   |  |
|---|--|
| 5 | Challenge 1. Automatic discovery and composition of services         |
| 4 | Challenge 2. Automatic API Alignment and Software-defined everything |

## Challenges Area 9: Dynamic Configuration, Provisioning, and Orchestration of Cloud Resources

- |   |  |
|---|--|
| 4 | Challenge 3. Multi-Cloud improved application assembly and automation                  |
| 4 | Challenge 5. Self-* across a diversity of cloud deployments                            |
| 4 | Challenge 2. Cloud Broker specialization for addressing specific vertical sector needs |
| 3 | Challenge 4. Novel decentralized Inter-cloud computing continuum                       |
| 3 | Challenge 6. Novel Orchestration and placement methods for hyper distributed cloud     |









# Cluster on Inter-cloud Challenges, Expectations and Issues

\*Thank you

<https://eucloudclusters.wordpress.com/inter-cloud-challenges-expectations-and-issues/>

## Contacts

- \* Ana Juan Ferrer, Atos [ana.juanf@atos.net](mailto:ana.juanf@atos.net)
- \* Jorge Gasos, European Commission

