Cloud computing as new technology
Cloud computing approaches can utilize available hardware and provide scalability: A move from computing as fixed investments to a service may mirror the move from companies independently generating their own electricity to moving to an electrical grid with central production. In the same way the electrical grid allowed economies of scale to produce electricity more cheaply, so can cloud computing approaches better utilize available hardware and provide scalability. Europe can gain substantially from new business and opportunities in the cloud.

1. Current barriers & challenges identified by participants

1.1 Existing socio-technical barriers

- **Lack of global legal framework**

The global nature of cloud computing often with distributed assets indicates a need for some international cooperation and consistency in laws across jurisdictions (e.g. data breach/notification). There is scope for involvement of international organizations on this matter, but it is important to ensure bottom-up feedback from users as well.

- **Diverging definitions**

Definitions of cloud computing vary greatly: some definitions strictly refer to infrastructure design while other definitions are broad enough to encompass nearly all online activity. The essence of cloud computing is the ability to provide a *service* on top of which users can create their own solutions.

- **EU discourses focus on risk rather than benefits**

European conversations on cloud computing often focus on concerns and less on benefits (economic, business, etc.).

- **Slow adoption of new technologies in EU context**

EU is at times slow in adopting/focusing on new technologies. The prolonged focus on grid computing instead of cloud computing being an apt example.

1.2 Current/future socio-technical challenges

- **Increasing transparency and user-control**

There is a need for more transparency and user control. Contracts vary greatly between different providers and often do not allow the user to control where his data is stored. In addition, many companies run services on a third company's cloud infrastructure. This may be unclear to the end-user who doesn't deal directly with the cloud provider yet relies upon the provider to secure the data and provide the actual computing service. Security in general is a concern; however, the perception of security by users is tightly linked to questions of transparency.

- **Enabling portability while allowing customization**

Designing interoperability/portability while allowing customization is a potential concern. Portability will allow users to move from one cloud provider to another; provide a more open marketplace and avoid platform lock in. The user can benefit from the infrastructure without knowing the underlying technology in detail.

- **Disclosing meta-data use**

Cloud providers can potentially gain a large amount of meta-data about the activities, locations, and contents of user interactions with their services. What data is collected and how it is handled could be better disclosed.

2. Moving forward: Strategies for bridging the gaps

- **Actively avoiding siloization of cloud computing in research and development.**
- **Enabling further development of sources of expertise around this 'young technology'.**
- **Building frameworks for knowledge exchange and closer connections between users, developers, and regulators.**
- **Facilitating increased interaction between Internet service providers and cloud providers.**
  ISP provides an essential underlying connection to the cloud, yet does not share in any revenue generation and is faced with an ever-expanding amount of data traffic.