1. Motivation

**Pervasive scenarios:**
- Are multiservice, multiprovider, multidevice
- Allow cooperation and collaborative apps. (e.g. Personal Networks Federation)

**Identity Management (IdM):** indispensable to provide a seamless/secure user experience within the ecosystem of pervasive services

**Goal:** Dynamic Federation

2. Current Identity Management Solutions

**IdM frameworks:** SAML/Liberty Alliance, WS-Federation, OpenId.

**Limitations:** No trust or rigid trust (based on static preconfiguration), poor scalability, users are mostly unaware, interoperability

3. Risk Assessment in Identity Management

Every actor has to make decisions that imply dealing with risk:
- **Pre-Federation Phase**
- **Post-Federation Phase**

We propose a **Risk taxonomy** that:
- Compiles the characteristics of Federated IdM systems
- Makes possible risk decomposition in small subsets. Useful to derive metrics for quantification
- Should be adopted by every entity to enrich its intelligence and to make well-informed decisions

4. Risk Taxonomy

<table>
<thead>
<tr>
<th>Metric Name</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1: Security Risk</strong></td>
<td>0–6</td>
<td>Measures the risk of unauthorized access or theft of data</td>
</tr>
<tr>
<td><strong>1.2: Trust Risk</strong></td>
<td>0–6</td>
<td>Measures the risk associated with the reliability of the system</td>
</tr>
<tr>
<td><strong>1.3: Interop. Risk</strong></td>
<td>0–6</td>
<td>Measures the risk associated with the integration of different systems</td>
</tr>
<tr>
<td><strong>1.4: Service-Specific Risk</strong></td>
<td>0–6</td>
<td>Measures the risk associated with specific services</td>
</tr>
</tbody>
</table>

5. Risk Metrics

*"If you cannot measure (or model) it, you cannot improve it"*
- Lord Kelvin

**Metric Name:** Integrity (INT)
- **Range:** 0 – 6
- **Description:** Measures integrity at transport and message level based on underlying cryptography.

**Metric Name:** Confidentiality (CONF)
- **Range:** 0 – 6
- **Description:** Measures confidentiality at transport and message level based on underlying cryptography.

**More metrics:** Level of assurance, SLA / Metadata compliance, Anonymity degree, Time validity window, Data Sensitivity ...

6. Work in Progress & Future Lines

- Aggregation of risks
- Definition of a comprehensive set of metrics
- Develop a prototype capable of engaging in secure dynamic federations

**Challenges:**
- We need to **modify current IdM systems** to:
  - Minimize dependence on pre-configuration, making entities autonomous and capable of making trust decisions dynamically
  - Introduce a **risk management model** to enhance security and deal with uncertainty
  - Take advantage of common knowledge and enrich trust mechanisms (e.g. reputation-based trust)

**Risk computation:**

\[ R = \sum_{i=1}^{N} R_i \]

Quantification is **hard** → no previous work in IdM

**Approach:** metric-based

**First step:** taxonomy