



# The MVCE Knowledge-Based Content and Service Adaptation Management Framework

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# Outline



- **Mobile VCE**
- **Ubiquitous Services Programme**
- **Content and Service Adaptation**
- **Challenges**
- **Proposed Solution**
  - Adaptation Manager
  - Content Adaptor
  - Interactions: The Dispatcher
- **Summary**



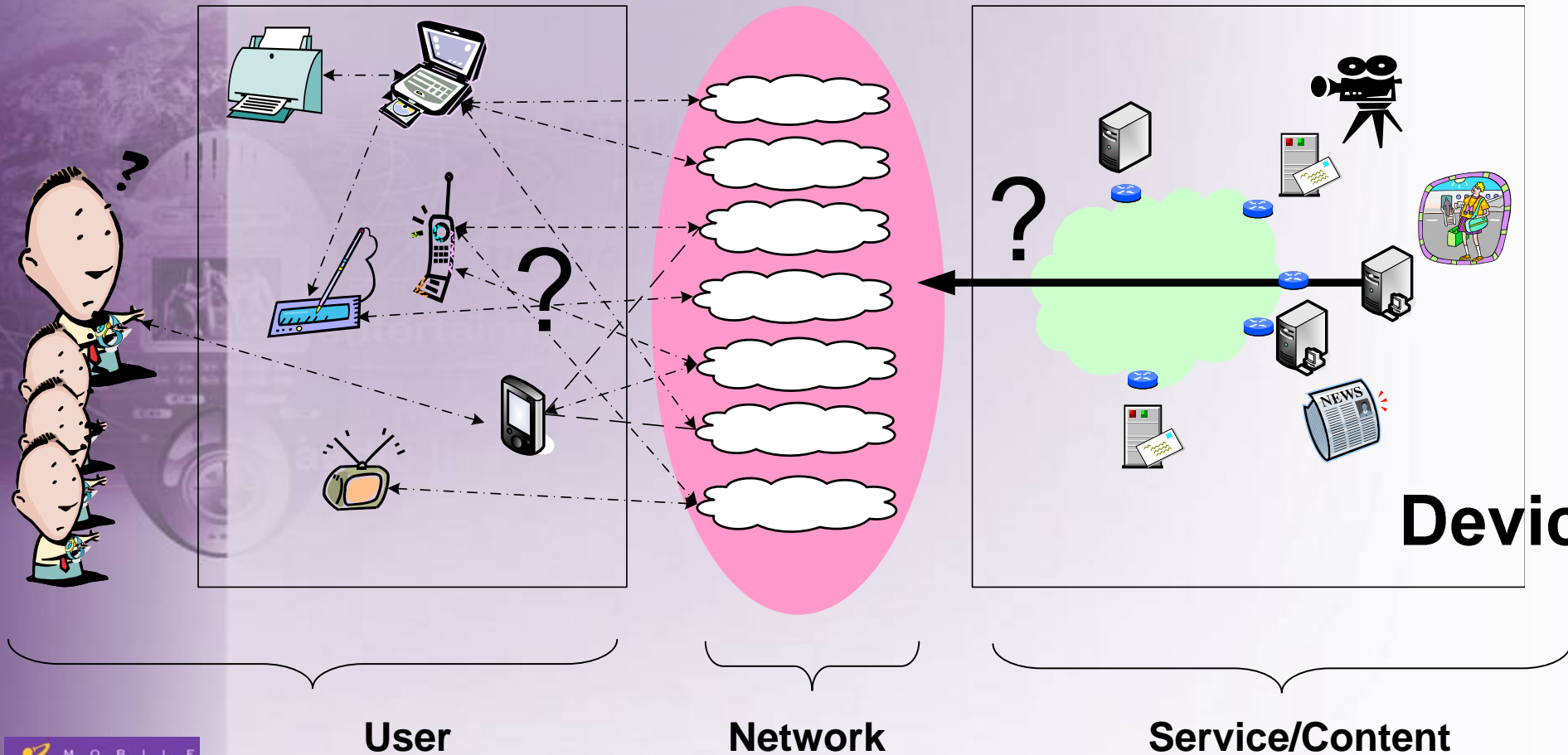
# Mobile VCE



- **Virtual Centre of Excellence in Mobile and Personal Communications**
  - 7 UK Universities
    - Surrey, Kings, Edinburgh, Strathclyde, Bristol, Southampton, Royal Holloway
  - Around 20 Industrial Sponsors
    - Operators, Broadcasters, Manufacturers
- **Funded by UK Department of Trade & Industry**
- **Website: [www.mobilevce.com](http://www.mobilevce.com)**



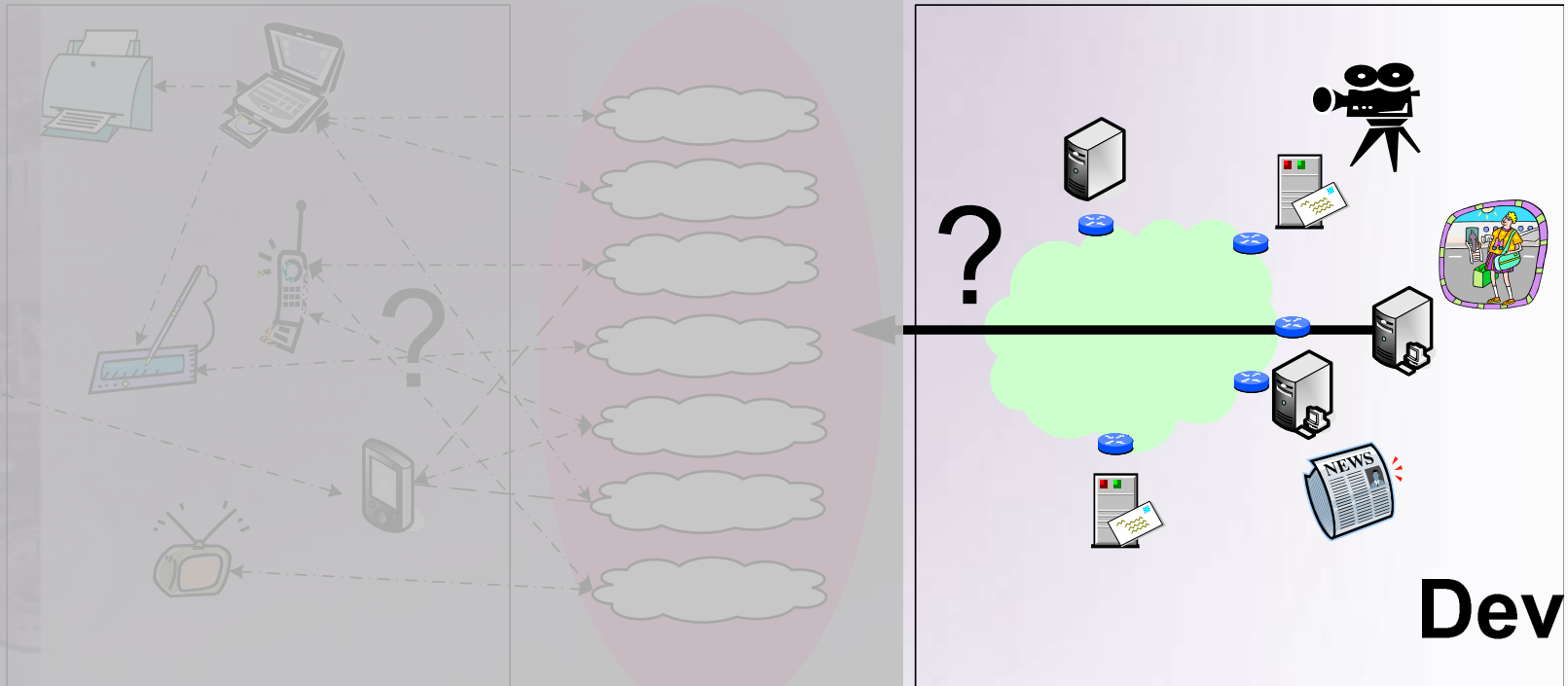
# Core 4: Ubiquitous Services



## Barriers in three domains



# Core 4: Ubiquitous Services



## Service and Content Domain



# Content/Service Adaptation



- **Service** is “action taken on the object when content is the object of interest”. Examples: transformation, presentation of content
- **Service adaptation** changes the actions taken upon the "object", e.g. the content delivery path or interface, while **content adaptation** changes "object of interest"
- To change the trigger of service, such as wake-up, or call diversion service is **NOT** considered as service, instead, the service is regarded as an **intelligent service**





# Challenges



- **User Domain: Users will own multiple wireless devices**
  - **Personal Assistant Agent**
    - To act on users' behalf
  - **Personal Content Manager**
    - To organise pan-device content storage & delivery
- **Network Domain: Networks are expected to use different QoS, mobility and security mechanisms**
  - **Network support sub layer**
    - to integrate mobility, QoS and security functions

# Challenges



- **Content and Service Domain:**
- **Traditionally, content/service delivery mechanisms considered only the heterogeneity of the different network access technologies without taking into account user context, user preferences and device capabilities**
- **Existing adaptation mechanisms e.g. media transcoding, image conversion, language translator use different heterogeneous interfaces. This makes their integration a complex issue**
- **No effective interaction mechanisms exist between the content service adaptation framework and the user's Personal Distributed Environment (PDE)**





# Proposed Solution

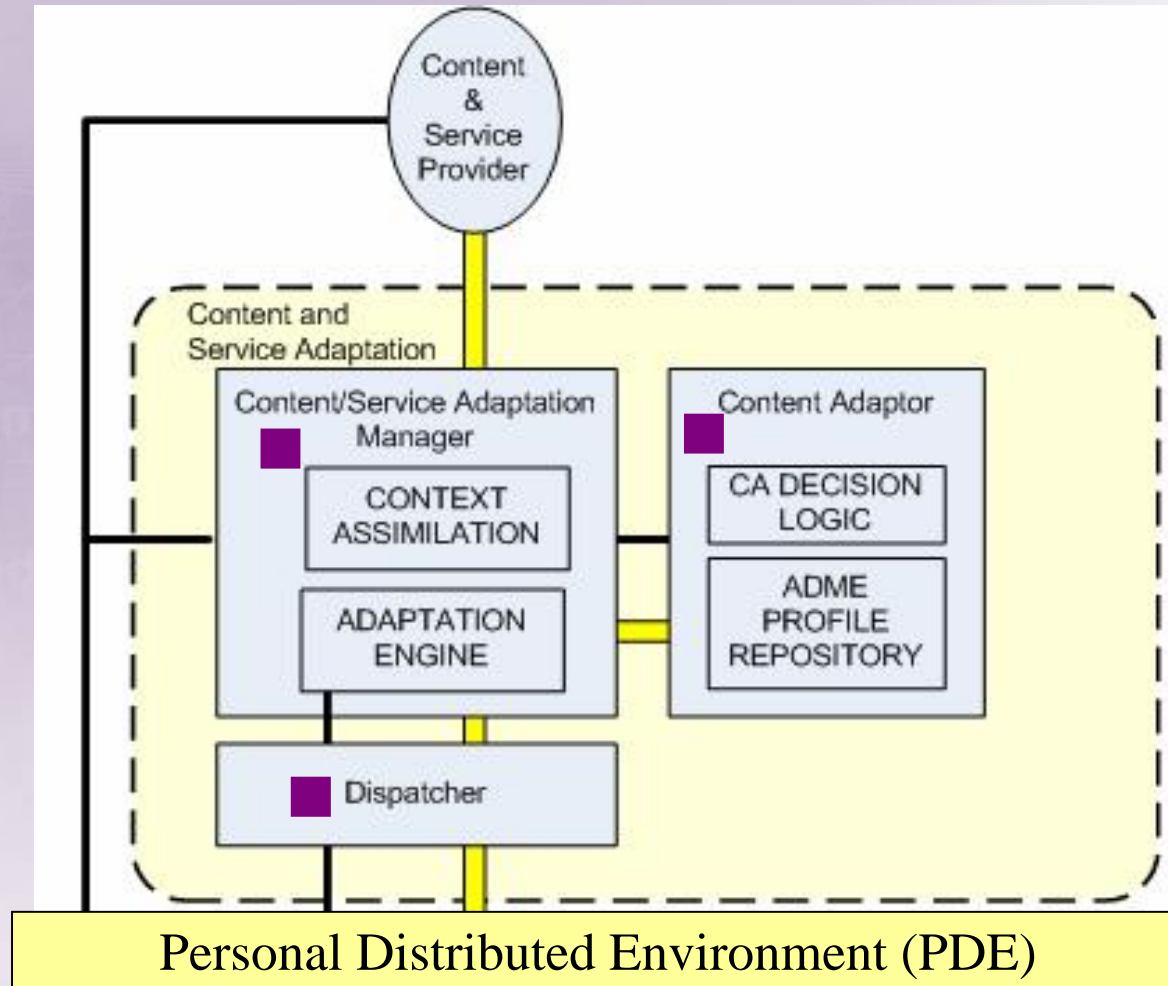


## To design a Content/Service (C/S) Adaptation Management Framework (AMF)

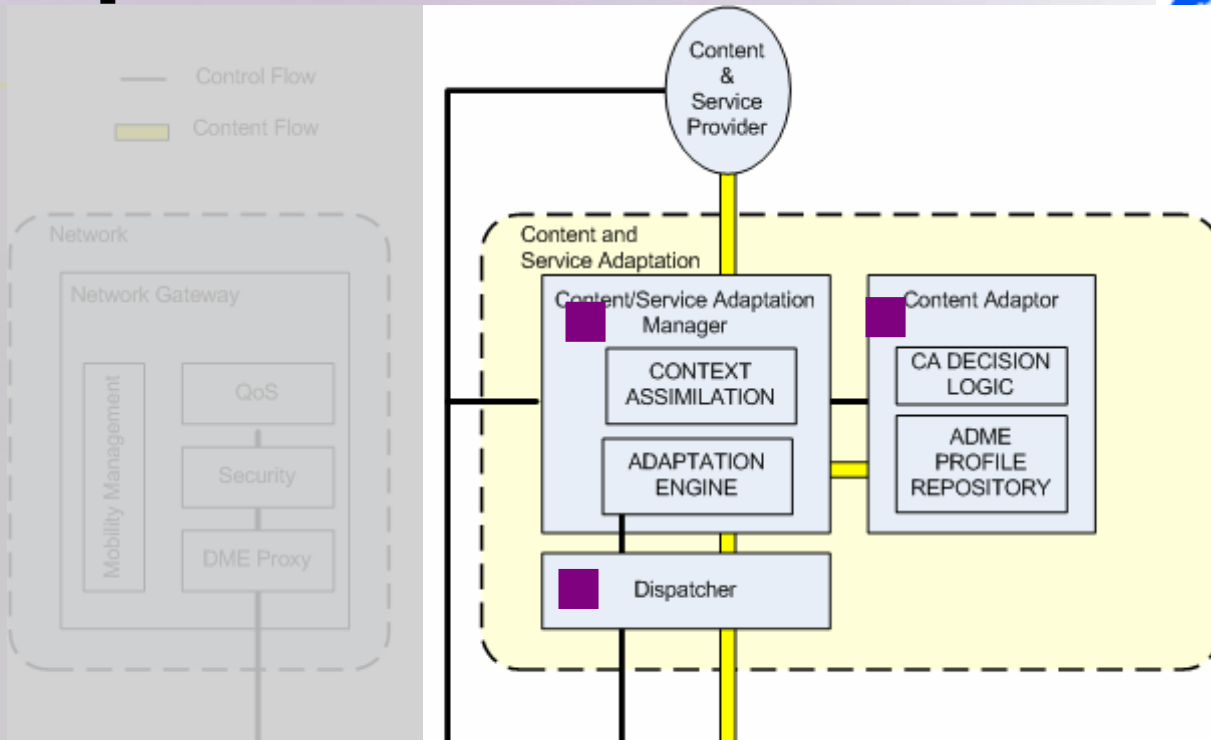
- **Adaptation Manager (AM):** manage and analyse the heterogeneous context information and make appropriate adaptation decisions.
- **Content Adaptor (CA):** provide management framework for existing adaptation mechanisms
- **Dispatcher:** provide management mechanisms for the interaction and communication the AMF and the PDE



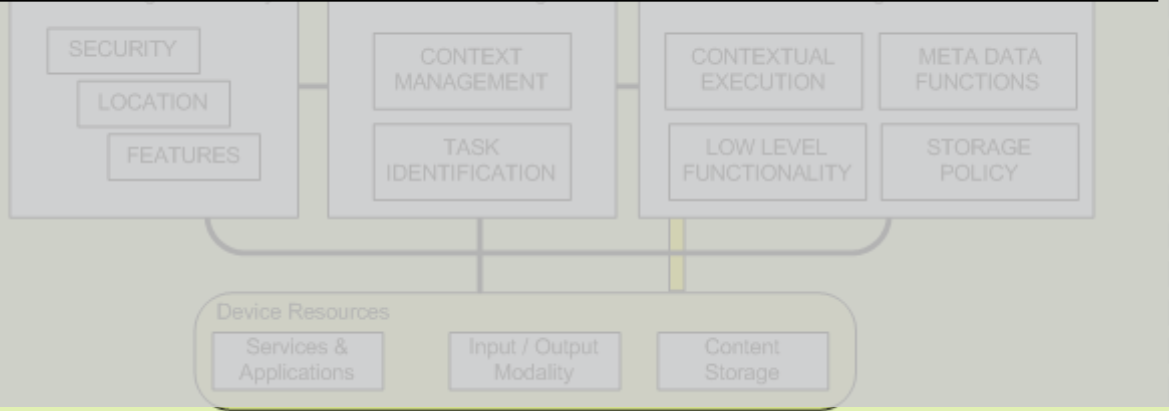
# Proposed Architecture



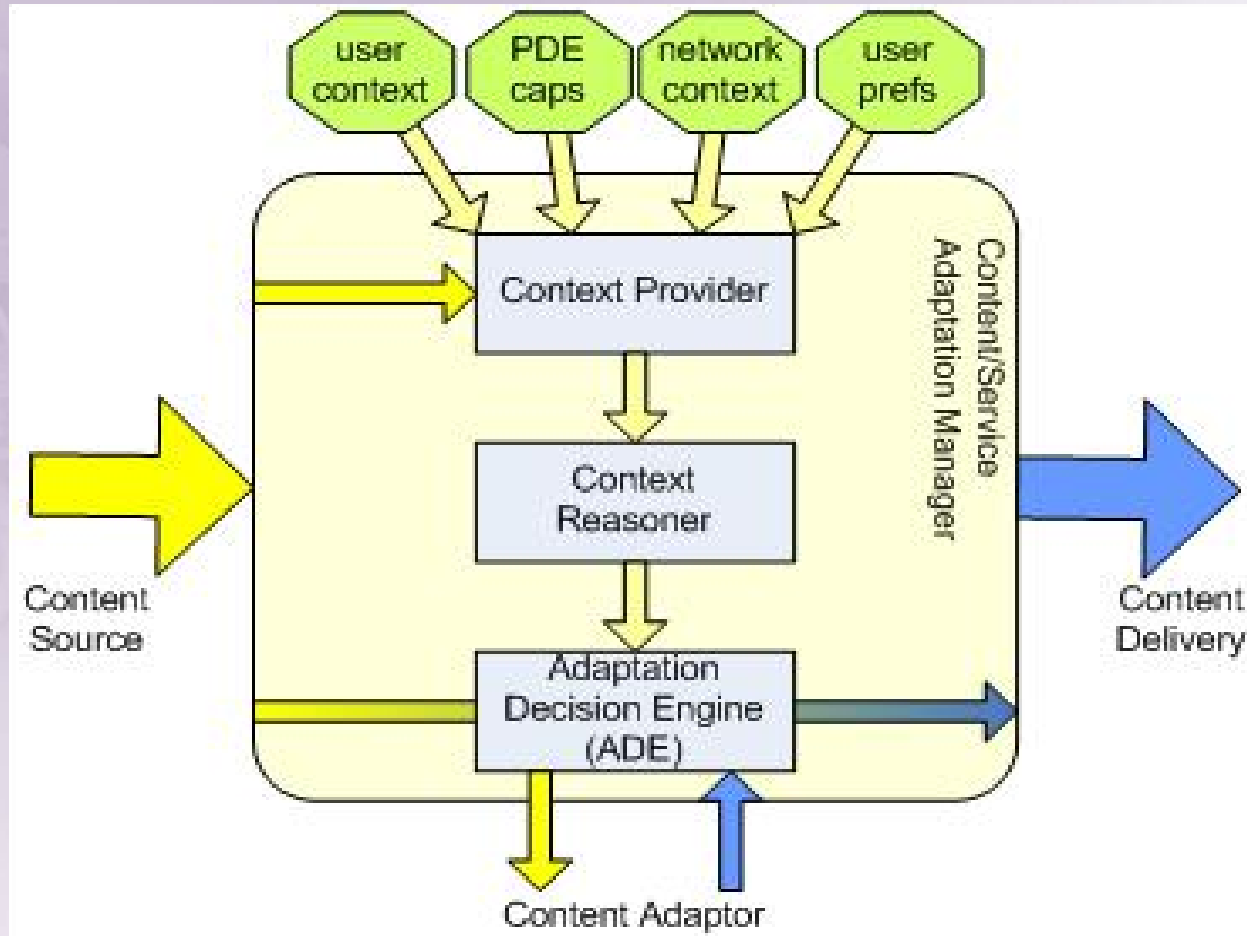
# Ubiquitous Architecture



## Personal Distributed Environment (PDE)



# Adaptation Manager



# Context Modelling



- **Context representation scheme:**
  - **Ontology** (out of key-value, markup scheme etc.)
- **Context representation language:**
  - **OWL** (out of XML, RDF, RDFS etc.)
- **Context ontology vocabulary:**
  - **Defined, MPEG-21 DIA, MPEG-7 etc.**
  
- **Generate an overall **C/S Adaptation Context Ontology** to provide common vocabulary for describing user environment, C/S and adaptation mechanisms**

# Context Modelling



- `<rdf:RDF`
- `xmlns:mvce="http://www.mobilevce.com/ubiquitous/AMFOntology.owl#"`
- `xmlns:xsd="http://www.w3.org/2001/XMLSchema#"`
- `xmlns:prf="http://www.wapforum.org/UAPROF/ccppschemata19991014#"`
- `xmlns:mpeg7="http://rhizomik.net/ontologies/2005/03/Mpeg7-2001.owl#"`

```
.....  
<mvce:Content rdf:ID="image">  
  <owl:onProperty rdf:resource="#mpeg7:height"/>  
    <owl:allValueFrom rdf:datatype="&xsd:integer"/>  
  <owl:onProperty rdf:resource="#mpeg7:width"/>  
    <owl:allValueFrom rdf:datatype="&xsd:integer"/>  
</mvce:Content>
```

```
.....  
<mvce:Device rdf:ID="PDA"/>  
  <owl:onProperty rdf:resource="#prf:CPU"/>  
    <owl:allValueFrom rdf:datatype="&xsd:string"/>  
  <owl:onProperty rdf:resource="#prf:ImageCapable"/>  
    <owl:allValueFrom rdf:datatype="&xsd:boolean"/>  
  <owl:onProperty rdf:resource="mpeg7:ScreenSize"/>  
    <owl:allValueFrom rdf:datatype="&prf:Dimention"/>  
</mvce:device>
```

- `</rdf:RDF>`





# Adaptation Manager: CP



- Receive PDE request
- Get PDE context
- Identify and get content/service context
- Get adaptation operation context
- Create/Add to adaptation context ontology
- Send feedback to PDE e.g. not authorised

# Adaptation Manager: CR



- Analyse and validate the context
- Check consistency of context
- Deduce more knowledge about the adaptation environment
- Maintain adaptation context ontology



# Adaptation Manager: ADE



- Choose the content version
- Decide the content output format
- Generate initial adaptation plan
- Hand the plan to CA
- Notify PDE e.g. not adaptable

# Content Adaptor



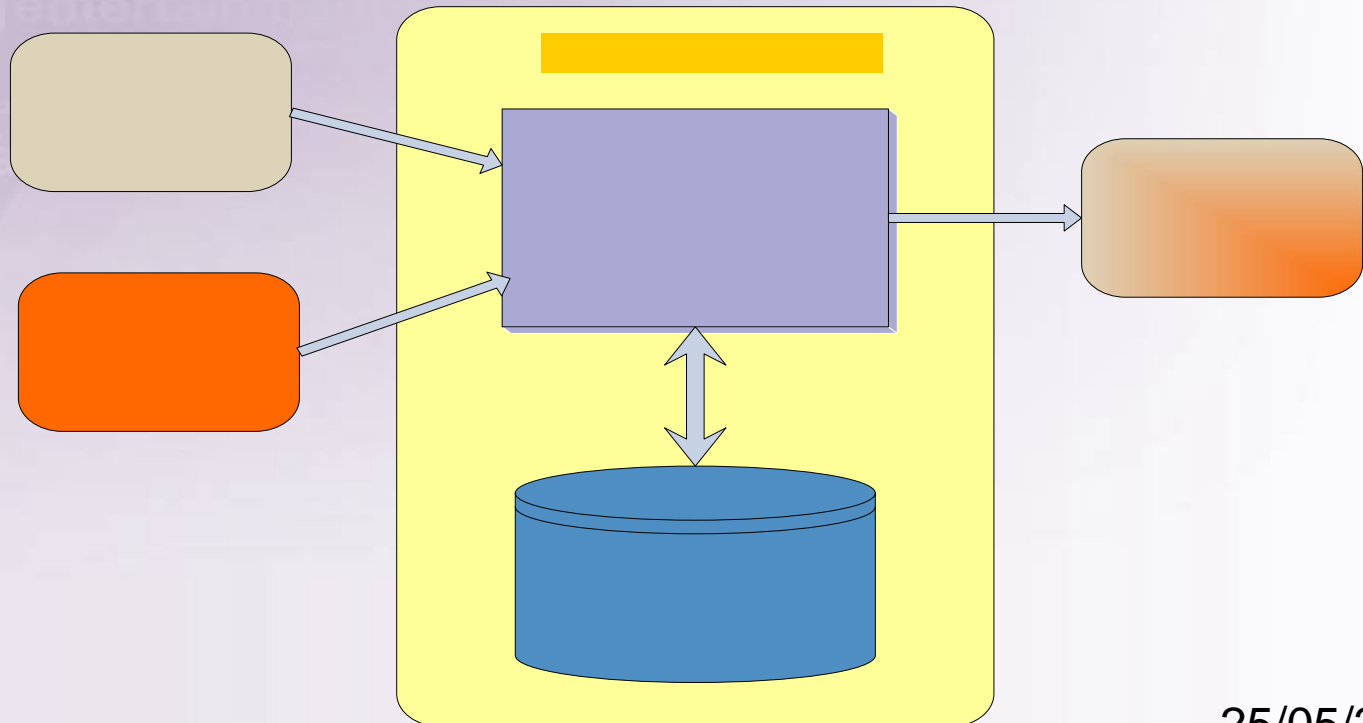
- **Adaptation Process**
  - Realization of Adaptation Manager's decisions
- **Adaptation Operation**
  - Intermediate steps that constitute an Adaptation Process
- **Adaptation Mechanism (ADME)**
  - Practical Implementations that perform single Adaptation Operations
  
- **An ADME can be available at:**
  - PDE Devices
  - Content Server
  - Third-Party Adaptation Service Providers



# Content Adaptor



- Translate Adaptation Decisions into specific Adaptation Operations
- Optimally select the appropriate ADMEs
- Carry out the Adaptation Process
- Manage ADME profiles, e.g. OWL-S, SA-WSDL



# Dispatcher

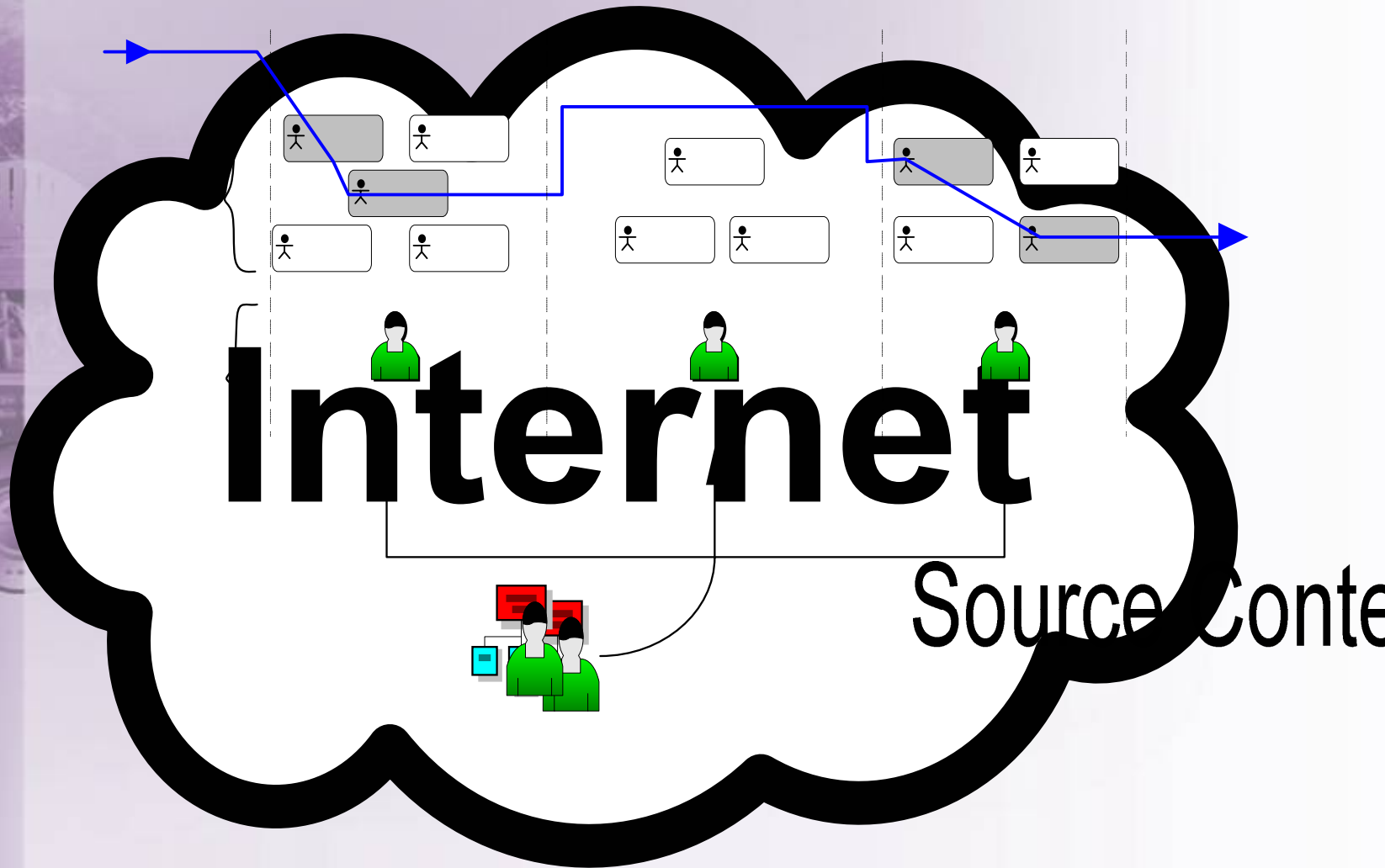


- AMF Service advertisement to PDE
- Negotiate communication streams between PDE, AMF and C/S Provider
- Routing of service requests to AMF and responses to PDE
- Load-balancing of AMFs and PDE devices
- Efficient interaction mechanism between heterogeneous entities
- Interface with legacy protocols/systems

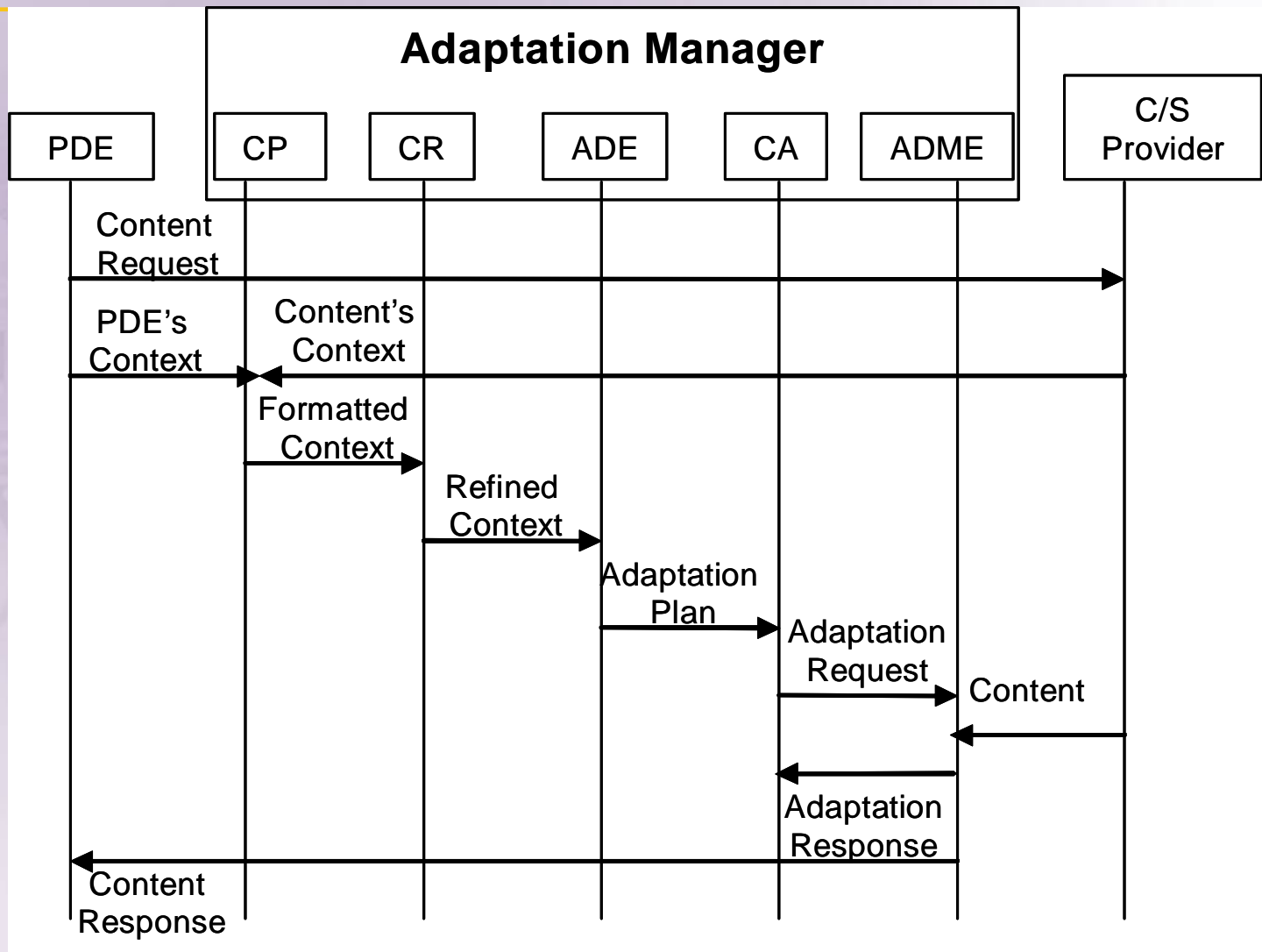




# Dispatcher



# Data Flow



# Summary

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- **The Adaptation Management Framework**
- Knowledge-based approach
- Distributed across network
- Management for Adaptation Mechanism



Thank you !

