

Impact of the Semantic Web on Multimedia Applications

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agenda

◆ technology overview

- ◆ relevant themes and technologies in development

◆ commercial interests and opportunities

- ◆ usage scenarios, user benefits
- ◆ revenue opportunities
- ◆ the profit equation - is it feasible?

◆ commercialisation challenges

- ◆ competitor considerations
- ◆ factors for success

◆ conclusion - is the technology not yet mature or is the market not yet ready?

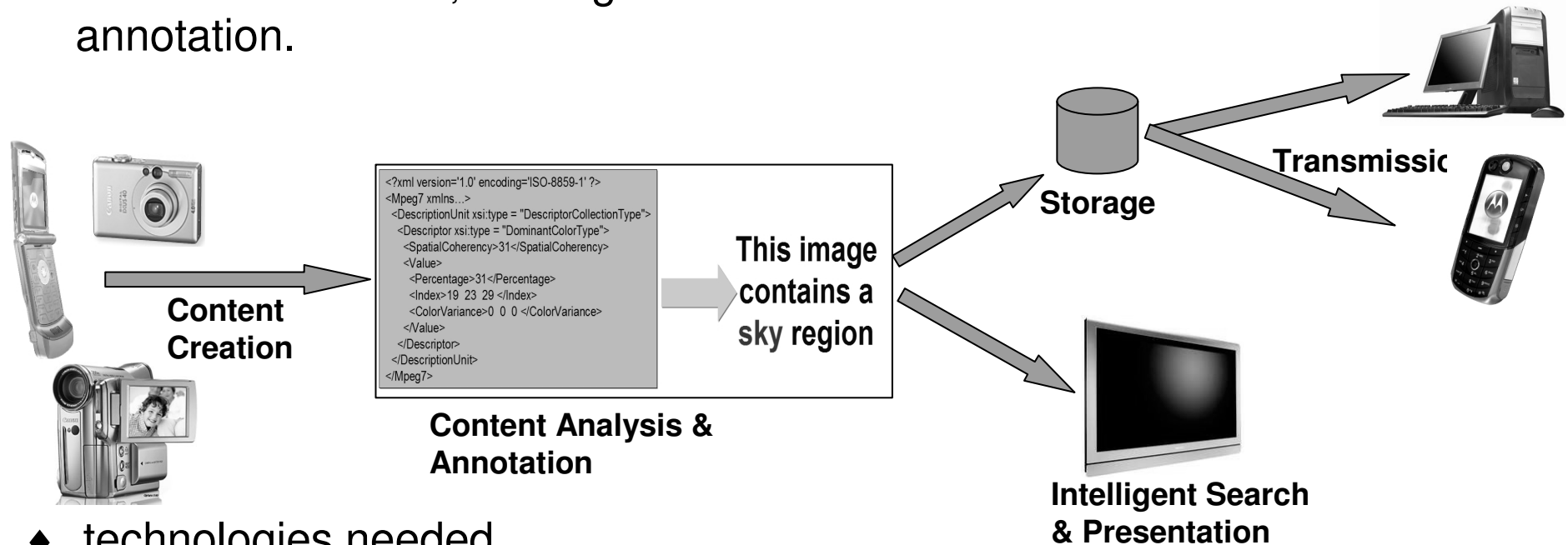
Relevant themes and technologies

- ◆ Focus on image retrieval - caption and content based
 - ◆ technologies discussed yesterday and today
 - ◆ content analysis (tools, software)
 - ◆ knowledge systems (ontologies, KB, reasoners)
 - ◆ semantic support (languages, models)
 - ◆ many international projects
 - ◆ Motorola engaged in aceMedia and MESH FP6 projects; use of analysis and knowledge systems to create new multimedia applications in content sharing and content personalisation
 - ◆ many other FP6 (and FP7) projects in the area (K-Space, X-Media etc)
 - ◆ many participants to the internationally recognised, benchmark setting TRECVID activity
 - ◆ important projects from IBM (Marvel and LSCOM), Microsoft (knowledge management, consumer media), Google (AI, machine learning), Yahoo (search, media experience)
 - ◆ *Interaction between the Semantic Web and Multimedia communities*

So semantic multimedia is a big business opportunity?

Example - aceMedia

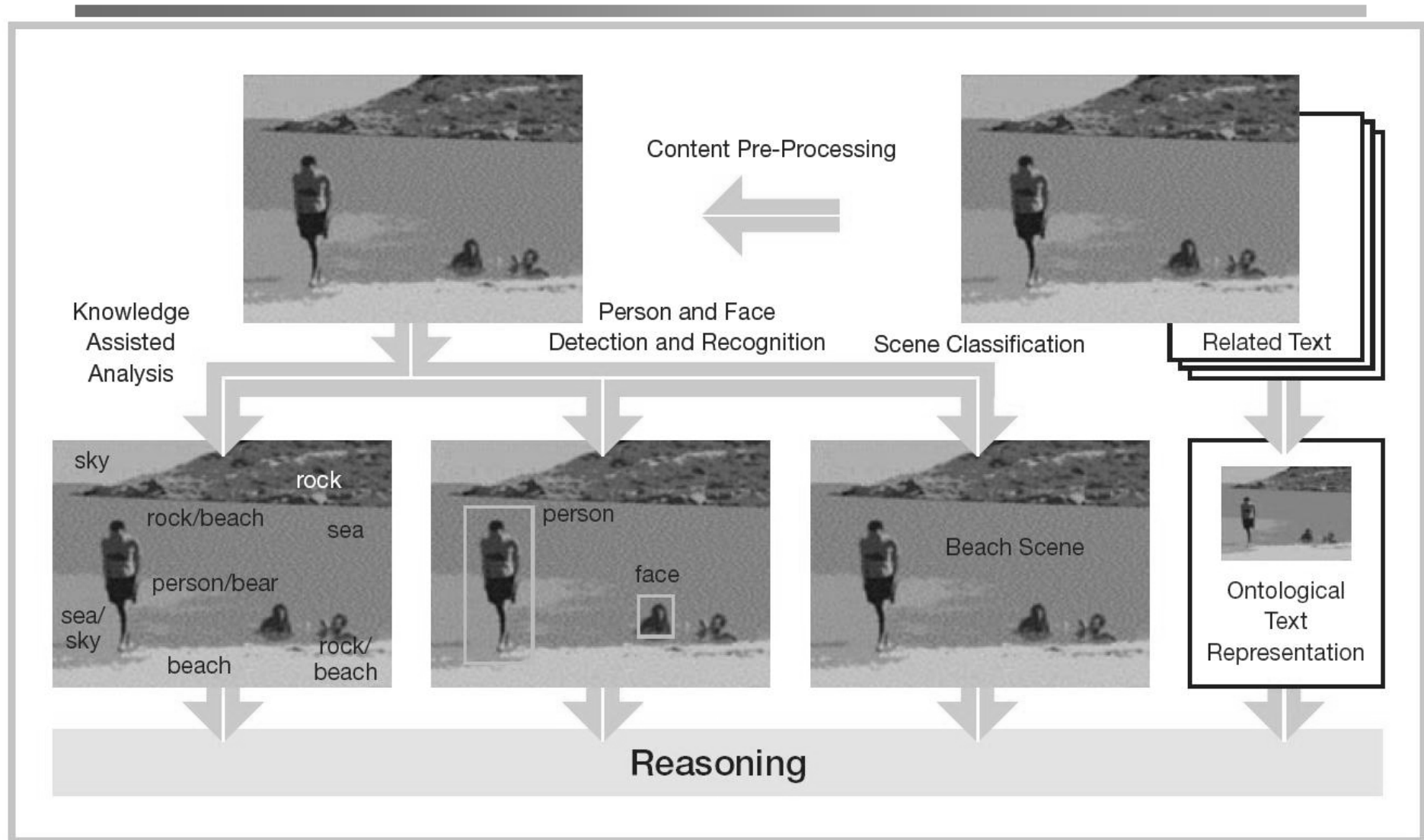
- ◆ aceMedia aims to discover and exploit knowledge inherent in multimedia content, making it more relevant for the user and automating annotation.



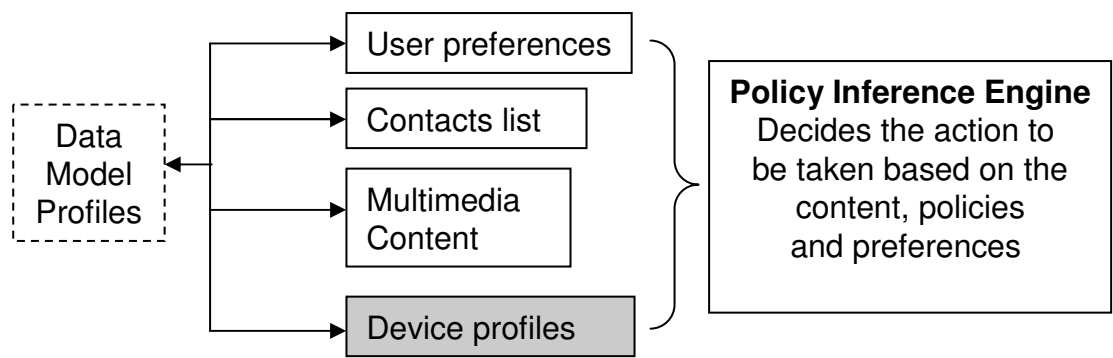
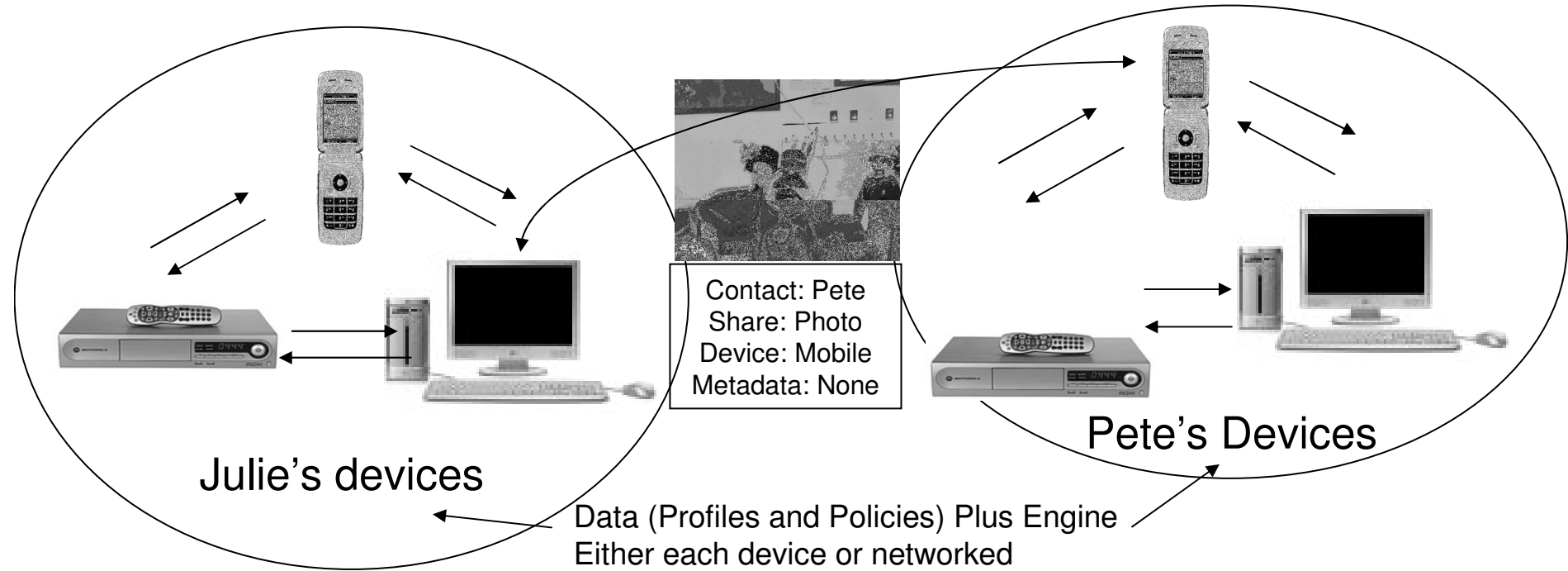
- ◆ technologies needed

- ◆ ontologies - core, multimedia and domain ontologies - for automated annotation and intelligent search
- ◆ reasoning tools for analysis and adaptation decisions
- ◆ context analysis for personalisation of search, content self-organisation and content self-governance (privacy protection)

Example – aceMedia content analysis



Example - preference and device content management



- ◆ Personal Content Management
 - ◆ Update Mobile with new music
 - ◆ Weekly photo sharing with grandma
- ◆ Self-governance
 - ◆ Attach the rules to the content so that the rules manage the content wherever it is
 - ◆ Only the rules needed go with the content
 - ◆ Rules are executable pieces of code

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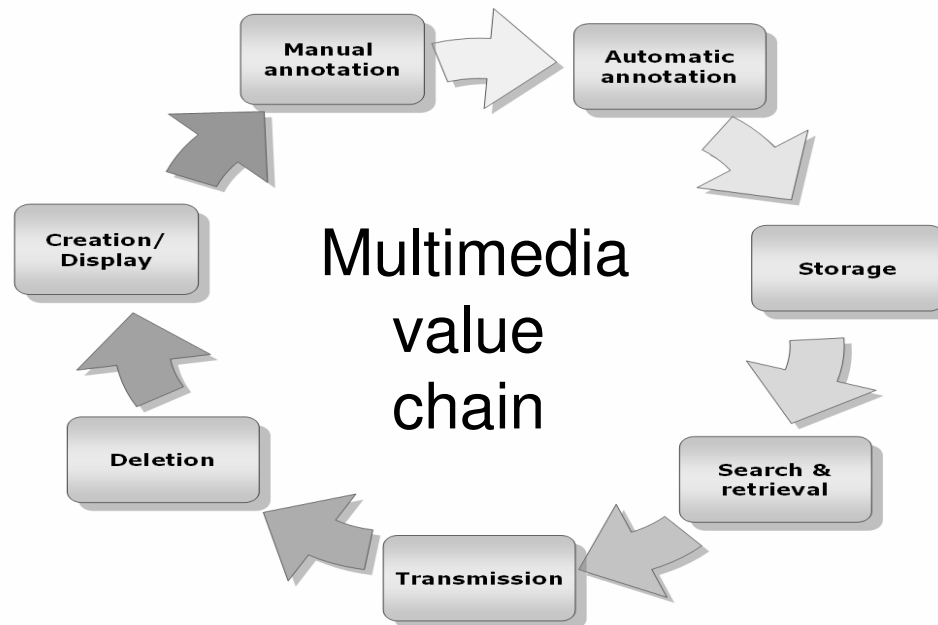
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Usage scenarios

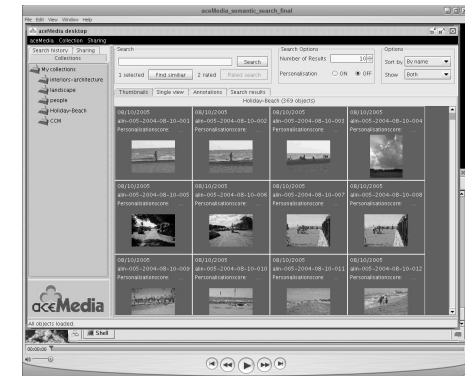
- ◆ Usage scenarios are important as they help us create the marketing rationale for the multimedia applications
- ◆ We must have high confidence that benefit is created for actors in the content value chain - creators, aggregators, service providers, network operators, consumers, and equipment manufacturers
 - ◆ otherwise we cannot justify the associated costs (see later)



Use scenario - personal consumer



- ◆ Gini is back from holidays in the Canary Islands and has a dinner with her friends tonight
- ◆ She uploads her pictures to her semantically aware multimedia system
- ◆ She adds personal annotations and the system creates automatic annotations
- ◆ She wants to show the coolest pictures to her friends tonight
- ◆ She starts browsing the collection
- ◆ ...but cannot find *a picture of herself on the beach with a boat* that she wants to show
- ◆ Gini runs a semantic query and a picture is returned
- ◆ It is not the one she is looking for so she starts a query for similar pictures
- ◆ Her friend sets up a rule on her mobile phone to have new content of Gini on the beach sent automatically



Unpacking the user scenario - what are the benefits?

User task	Current limitations	With SW technologies
Move content from phone or camera onto the PC	Using a file system, manually give all folders and items a meaningful name that you will remember later. Move the items one by one into the folder	Label a "collection" with a chosen name for manually or automatic content assignment direct from the phone or camera
Search for content at some time in the future	Try to give each item (file) a meaningful name so that you can remember it later	Automated content analysis which will add tags about the items ("beach", "sunset", "boat" etc) which can be used for later searches
Share themed or linked content with friends	Manually select items and copy them to a new folder to send by email or put on a memory stick	Identify a theme for the collection and allow chosen people to access it using user defined rules

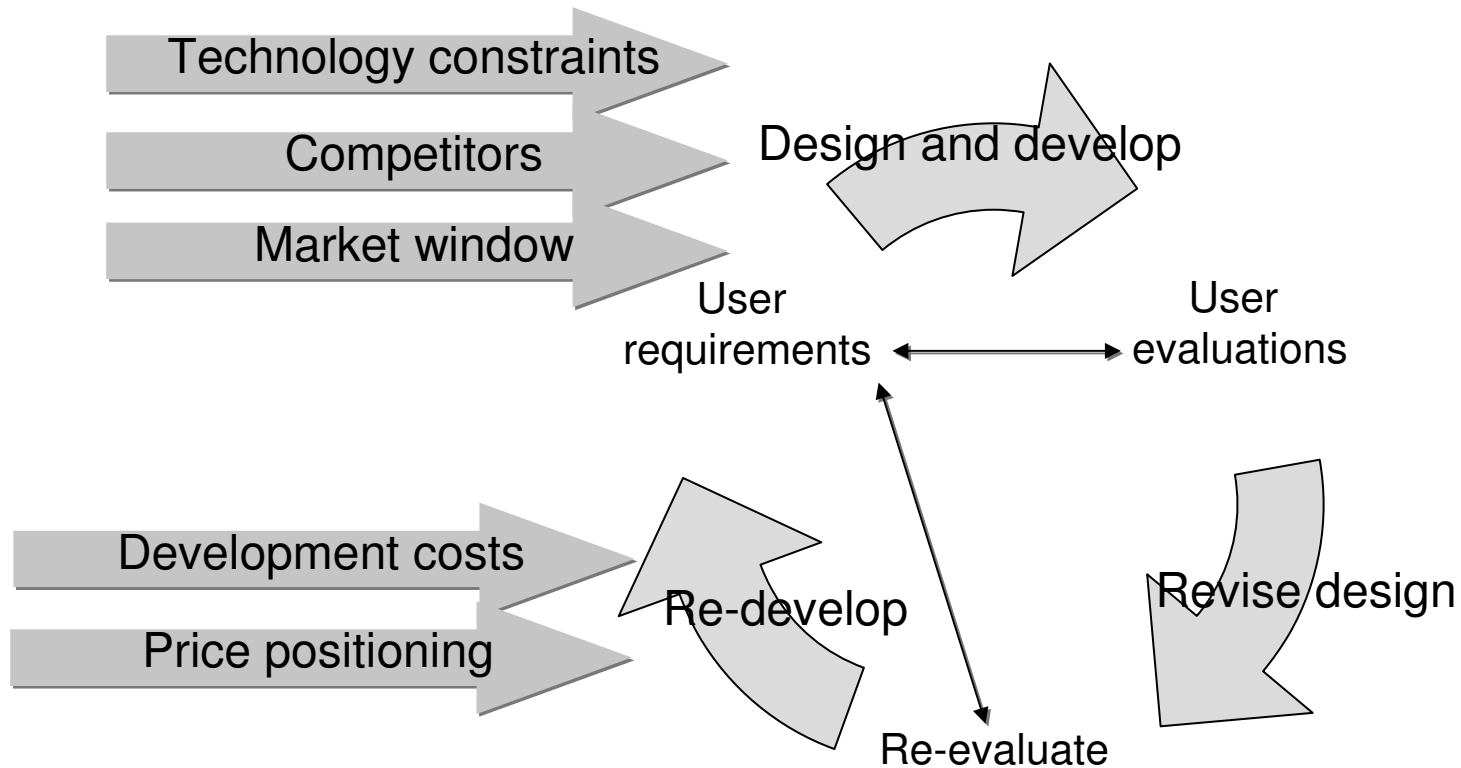
What are the benefits? (cont)

User task	Current limitations	With SW technologies
Quickly find all items containing a named person	Manually label pictures with every person's name	Automatic face recognition so that names are automatically added to the tags
Make sure family or friends always see your latest pictures	Manually email each person with each new picture or video clip	Automated rules so that your friends always know when there is new content
Find exactly the memorable sunset picture from all your sunset pictures	Search through all photos you think might have a sunset	Visual similarity search will present you with all your sunset pictures in a single view
Find a clip on a chosen theme	Keyword search which must match exactly the metadata (e.g. "Mary playing tennis")	Natural language queries which need only be approximate (e.g. "my sister playing sports")

Why would the user pay for these benefits?

- ◆ Do they meet an important user need that they cannot get anywhere else?
 - ◆ communication, information, entertainment, expression
 - ◆ largely solved by existing systems
- ◆ Do they enable the consumer to create value or derive a benefit which exceeds the cost of the product or service?
 - ◆ time saving for the busy consumer
 - ◆ enable the user to derive long-term enjoyment of their content
- ◆ Do they save the professional user time, money, or problems?
 - ◆ cheaper than alternatives that are perceived as equivalent, or give better performance or productivity than current systems
 - ◆ automating tasks which are currently manual

Does meeting user requirements guarantee commercial success?



Additional criteria for commercial success

◆ Complete value chain support

- ◆ intelligent personalised search tools need appropriately annotated content
 - ◆ *must ensure that tools for content providers are created as well as those for end users*
- ◆ intelligent context-driven content adaptation must be supported at server or network nodes
 - ◆ *must create system components as well as client applications*

◆ Compatibility and interoperability

- ◆ integration of new tools and software into existing systems
 - ◆ *must apply appropriate standards*
- ◆ customer confidence in the system and its future deployment
 - ◆ *must influence and create new standards*



Additional criteria for commercial success

◆ Preparing the market

- ◆ awareness raising before products are even specified
 - ◆ *general dissemination material*
 - ◆ *exhibitions and demos*
- ◆ generate interest via Open Source tools
 - ◆ *common model where limited features available free, but fully-featured versions must be paid for*



◆ Protection of competitive advantage

- ◆ maximise the period of exclusivity
 - ◆ *protect intellectual property generated in the project*
- ◆ prepare for future upgrades - predict the market changes
 - ◆ *start work on new features for the next version before the current version is released*

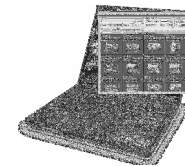
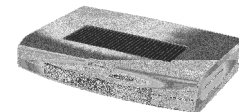
The profit equation

- ◆ Products and services must make money
 - ◆ profit = sales revenue less costs arising from
 - ◆ *manufacture (parts and labour)*
 - ◆ *distribution (logistics)*
 - ◆ *marketing (sales admin and direct marketing costs)*
 - ◆ *research and development*
 - ◆ *channel margins, retailer margins*
 - ◆ *product support (customer and channel support)*
 - ◆ *general company admin (facilities, insurance, legal)*
 - ◆ *taxes*



The profit equation - is it feasible?

- ◆ What semantic enhanced multimedia products, applications and services can we sell?
 - ◆ improved content management software for PC platforms
 - ◆ integrated multimedia applications on cameras, phones, PVRs
 - ◆ end-to-end content distribution systems
 - ◆ push-based content self-advertising systems
- ◆ Who do we think we can sell these to?
 - ◆ Consumers (end users)
 - ◆ Professional content users (advertising, publishing, design)
 - ◆ Enterprise users (security, logistics)
 - ◆ Public safety (emergency services, medical)



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Does meeting user requirements guarantee success?

- ◆ it depends on whether the customer (end user) feels that your solution is
 - ◆ better value than competitors' offerings
 - ◆ meets their needs better than alternatives
 - ◆ will remain appropriate for a reasonable period of time
- ◆ and if the chosen market segment is large enough and/or willing to pay a high enough price for your system
 - ◆ there are only a finite number of broadcasters, emergency services groups, etc if you are targeting niche markets
 - ◆ consumers are generally very price sensitive
- ◆ and it depends on whether the commercial partner or sponsor (the supplier side of the value chain) feels that your solution is
 - ◆ significantly better than the state of the art
 - ◆ can be developed and implemented with appropriate costs
 - ◆ can get to market within the available window of opportunity

Competitors - current solutions

- ◆ Many products and service solutions available to professional and home users for indexing and annotating video, with established customer base and integrated into organisational workflow
- ◆ Some examples
 - ◆ Virage, Adobe, IBM
 - ◆ Web solutions such as Picasa, Flickr, Kodak
- ◆ Do semantic technologies replace or complement these existing systems?
 - ◆ semantic technologies can offer some differentiating technology e.g. automated metadata generation, automated content collections
 - ◆ semantic technologies can offer a part of the value chain that they don't have already e.g. personalised content adaptation, personalised content selection

Key success factor - user acceptance

- ◆ user evaluations

- ◆ many projects conduct end user evaluations (but still some do not!)
- ◆ valuable information about usability and suitability of the technology
- ◆ leads to refinement of the methods and tools which improve user experience
- ◆ example user evaluations in the aceMedia project :
 - ◆ *ensuring a wide range of users were consulted (balancing age, gender, nationality, levels of IT skill etc)*

I see the benefit of [annotating] on the mobile, because .. when I'm looking at my photos [later] I can't remember where I've taken them

If you're sending a photo to your friends you might not want ... people from your work to be able to see that, so I think it would be important to be able to set [privacy] rules

- ◆

system in an iterative process
live data collected and analysed
efficient
ly into the users' workflow
is means integrating with established

[aceMedia] is convenient, quick, fast for [photo] sharing

for the consumer, this means integrating with their current applications

- ◆ *users may change over to a completely new tool or method if they believe it would be such value that the "cost" of changing would be paid back via significant benefits with the new system*

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conclusions

- ◆ many semantic multimedia projects researching and developing technology which is
 - ◆ technically highly innovative
 - ◆ meets user requirements
 - ◆ has involvement from commercial companies
- ◆ but there are many hurdles to overcome in order for such projects to achieve commercial success
 - ◆ improvement over the state of the art
 - ◆ realistic and viable development costs
 - ◆ offering something that competitors cannot readily copy
 - ◆ exploiting the available market window
 - ◆ targeting an appropriate selling price
 - ◆ creating a realistic business model
 - ◆ generating long-term competitive advantage

contacts

- ◆ Email : coordinator@acemedia.org
- ◆ Website : <http://www.aceMedia.org>

- ◆ **Acknowledgements**

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