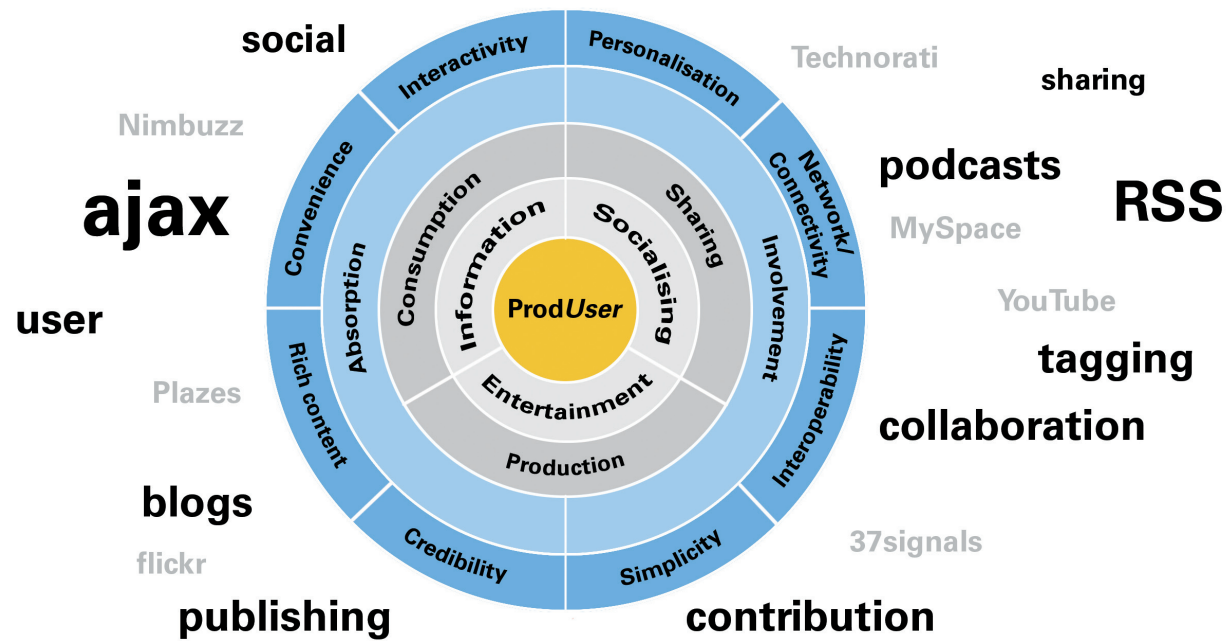


Web-Reloaded?

Driving convergence in the "real world"



Preface

Just ten years ago, personal computers started to become a tool for everyone. But networking including the reach and capacity of the public Internet were still very limited. At the end of the 1990s, dial-up Internet connections became common in many European and North American households, but the Internet was still mostly a tool to search and exchange information. A few years later, faster broadband connections started to replace slow modem connections.

With faster Internet speeds, the type and scope of applications and services available on the Internet have boomed. The Internet has developed from predominantly an information tool to an enabler of entertainment, transactions and socialising, and has become an essential element in many people's daily lives. Most recently as bandwidth has increased in mobile phone networks, the Internet has also become mobile.

New developments emerge very rapidly, especially in the Internet world. Some are transient phenomena which burst on the scene and then disappear within a very short period. Others have a lasting effect. One set of phenomena on the Web, which has been seen lately, has been dubbed Web 2.0. In Gartner's "2006 Emerging Technologies Hype Cycle", Web 2.0 was selected as one of the top key technologies over the coming ten years. However, what Web 2.0 actually stands for seems very unclear. When Basecamp asked 1000 of their customers what Web 2.0 meant to them, 13% answered that they didn't know what it was. Of the 87% who answered yes on the question, nearly everybody came up with a different description.

In recent months, Arthur D. Little has been engaged in a number of client projects and internal assessments which address the development, changes, challenges and ways of positioning a business within the newly emerging Web phenomenon. In this paper we present the findings and insights towards the understanding and implications of these Web trends which have emerged so far.

We have realised that it is necessary not only to assess effects within the Web sphere itself, but also to expand the perspective into neighbouring industries where the influence of the Web is growing considerably. We believe that the phenomena covered under the Web 2.0 umbrella will have very far reaching and broad consequences for other TIME industries. Even the long predicted convergence of the TIME industries finally seems to become a reality – at least on a service level. The Internet bubble at the end of the last century could not deliver on this promise to drive the unfolding of an age of digital convergence. Today the signs point in a different direction – preconditions in terms of technology and understanding of capabilities and economics have changed. While six years ago, digital convergence was not operationally feasible – among other reasons, due to technical limitations (i.e. lack of broadband penetration and device capabilities) most of these limitations have now been overcome, and convergence is being driven by the smart innovators using the potential of the Web. These companies have understood that the Web is changing user behaviour. Most new services are user centred, and the changes taking place in the way people use the Web will not only affect the Web world, but eventually spread to the neighbouring TIME markets.

Before we elaborate on the Web phenomenon we present an overview of the underlying drivers of the current developments in chapter 1. Our perspectives on Web 2.0 are then outlined in chapter 2, followed by a look at the dominant business models of Web services in chapter 3. Finally, in Chapter 4 we derive implications of the Web world for TIME markets and participants.

Chapter 1 – **Growing up? The Web**

Useful information for chapters 2 and 3

1

Chapter 2 – **I thought we were talking about Web 2.0?**

Definition of Web 2.0 and key aspects

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Business models in Web services and their funding

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Chapter 4 – **What to make of this**

What impact the “new” Web will have on the TIME markets

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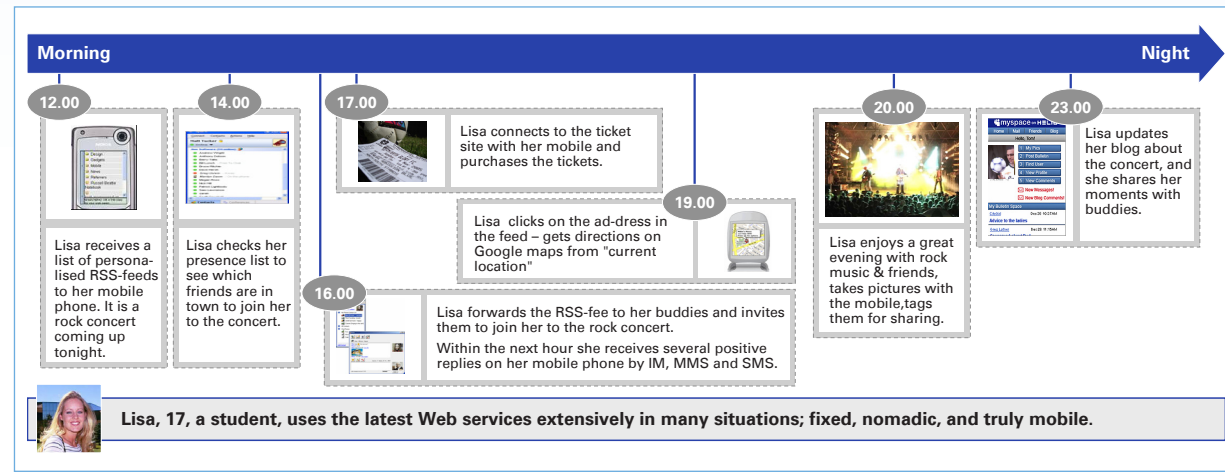
Chapter 1 – Growing up? The Web

Just ten years ago, personal computers started to become a commonplace household device, but the Internet was not ready for the mass market. Today, however, new Web services allow users to actually combine their real-life activities with the support of Web services. User centred services change the way people use the Internet and affect the way they organise their lives.

Prologue

To document the changes that took place over the last years, we will show an example of a young person using the full potential of the Web in a typical day. At the moment, young people constitute the majority of the Internet users, and will increasingly define the mainstream as more of them enter the workforce and start to occupy decision making positions. Their expectations, attitudes and familiarity with the Web world will shape the future environment, both within businesses and in the markets they serve.

Lisa: “The net is part of my social life as I use it not just for information but also for communication and meeting cool people”



Source: Arthur D. Little

Lisa's day

12:00

Just got an update on the phone about a concert tonight... With the smart query, I get all the information I need with just a push on the button. The band seems really interesting. Read some stuff about them in a blog on my favourite social networking site. Also listened to some unpublished material and latest concert recordings. Sounds good – think I'll check it out.

14:00

Forwarded the feed to my friends who are online. Somehow, Tom never is. Sent an invitation to him by email anyway.

18:00

Everybody wants to go! I'm really happy I don't have to check my email-inbox, short message folder and instant messenger separately. Simply sorted my communication by the thread. Already ordered the tickets with my mobile phone and forwarded them. It is really nice not to have to wait outside to give out the tickets. I can just store it in my phone. Even Tom is going to come.

20:00

Just took about 25 pictures of us. With the nice tagging feature, I can just upload them to my blog without having to go through them again to rename them.











24:00

It's done; I updated my blog. All the pictures are there and my friends can see them on their way to work tomorrow morning. I just saved them with the message thread from this afternoon, so I do not even have to send a link. Got to go to sleep now – even though I'm tempted to read through some nice messages commenting on my profile on the networking site – some are really cute...

What happens in the “new” Web? ...Web services by the minute

Despite (but since) the bursting of the dotcom bubble in 2001, the popularity of the Internet has not stopped growing. Numbers of Web services are experiencing immense growth rates in their number of visitors. The smart innovators, companies like MySpace, YouTube and Flickr – all sites with a community aspect – have recently broken into the top ten of the most popular Internet services.

Web companies challenge the “real world” industries in different fields ranging from communication services to social communities

History?	Examples
1 VoIP	 <ul style="list-style-type: none"> August 2003, Skype launched its now popular PC client enabling VoIP calls between PCs, from PCs to fixed/mobile and from mobile to mobile. 2006 nearly about 7 m registered users are online per day.
2 Communities	 <ul style="list-style-type: none"> July 2003, MySpace launched its social community site. Today there are 116 m registered users and about 52 unique visitors per month. Sold for \$ 580m in cash to News Corp. in July 2005. More than 100 million users registered by September 2006; placed no. 8 in the list of top 10 Web sites by brand in April 2006.
3 Photos	 <ul style="list-style-type: none"> February 2004, Flickr launched its photo publishing/sharing site. Within 2 years Flickr reached about 4,5 m registered users/17 m unique users per month. Flickr.com was acquired by Yahoo! in 2005 for USD16-22m. Over 70 million tagged photos stored on the site, one of the 1000 most popular Internet services worldwide at the moment.
4 Videos	 <ul style="list-style-type: none"> February 2005, YouTube launched its video publishing/sharing site. Within 1,5 years YouTube reached about 0,5 registered users/20 m unique visitors per month. At the moment, more than 100 million views per day, 65,000 new posts per day and 60% market share of all videos watched online in the US. Simplicity of use is key: 110 video formats and 64 audio formats supported and there is no need to register to view the videos. In October 2006, YouTube was acquired by Google in a €1.3b stock-for-stock transaction.
WHAT'S NEXT ?	     

Source: Arthur D. Little

Popular Internet sites



myspace – online community

➔ www.myspace.com



youtube – videosharing platform

➔ www.youtube.com



flickr – photosharing community

➔ www.flickr.com

In addition to these popular sites, an increasing number of new Web services are emerging every day. The main difference from the “old Web” is that new services put users at the centre of attention. Increased interactivity and user participation set these services apart, although for some of them no clear sustainable business model is as yet observable. Are we moving into another hype cycle, or is Web 2.0 a phenomenon that will last?

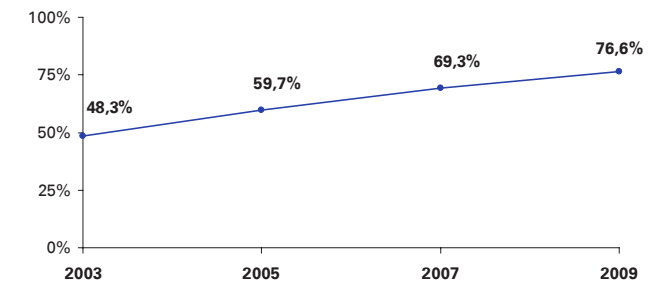
Internet usage – Driven by young people

The Internet plays an essential role in many people’s lives. Increased Internet usage has had a noticeable impact on people’s media consumption. As seen in the example of Lisa’s Web day, the Internet plays an increasingly important role, especially in the life of young people.

- Almost four out of ten Europeans use the Internet seven days a week. On average, people spend 10.2 hours online per week.
- 24% of the people who go online are heavy users who spend more than 16 hours per week online. Young people in the age group of 16-24 years are the most active Internet users. They spend 12.6 hours online a week, and comprise the highest share, 36%, of heavy Internet users.
- The Internet accounts for a growing proportion of people’s total media consumption. Today, media consumers in Europe spend more time surfing the Internet than they do reading newspapers and magazines combined.
- Primary reasons for carrying out more activities on the Internet are convenience, speed and the simplicity of the Web.
- To write and receive emails is the most popular activity. In the US, 91% of the people online write and send emails. Other popular activities, which attract 70-80% of the Internet users are searching for health information, doing product research and reading news.
- There are some evident generation differences in online activities. The youngest generation, between the ages of 12-28, is more likely to engage in Internet activities that involve communication, creative and social uses, such as instant messaging and blogging. The older generations, aged 28 and above, are more frequent users of online applications where money is involved, including travel reservations and online banking.

Sources: EIAA, EITO, Pew Internet, Arthur D. Little analysis

Web users in Europe (% of population)

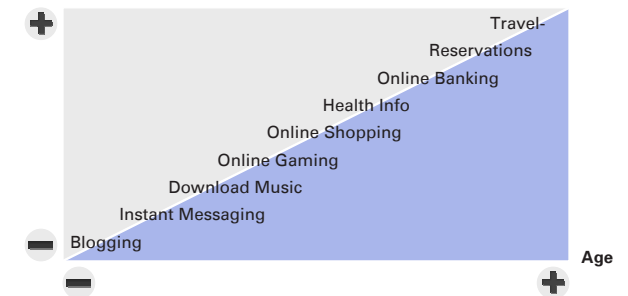


➔ The share of Web users in Europe is growing steadily

Sources: EITO, Arthur D. Little analysis

Online activities by age

Money involved



Sources: Pew Internet, Arthur D. Little analysis

Fixed Web – Web usage through all age segments!

The growth of broadband penetration is contributing to the increasing number of Internet users. It is highly unlikely that the changed habits of Internet users would have developed without the corresponding improvements in infrastructure and with high speed access being available for nearly every household at affordable prices.

- ➔ In 2004 not even one out of ten households in Europe had access to broadband. Today (second half of 2006), this figure has almost doubled, and by 2010, nearly 80% of all European households are expected to have a broadband connection to the Internet.
- ➔ The younger the people are, the more they tend to go online. Young people between the ages of 16-24 have the highest level of participation as Internet users at 82%, while in the segment of people 65 years and older, fewer than 14% go online today on a regular basis. Still, interest in the Internet is growing among the older generations. In Germany, the share of Internet users who are 60 years and older, has doubled during the last four years. Today, 35% of Germans in this group regularly go online.

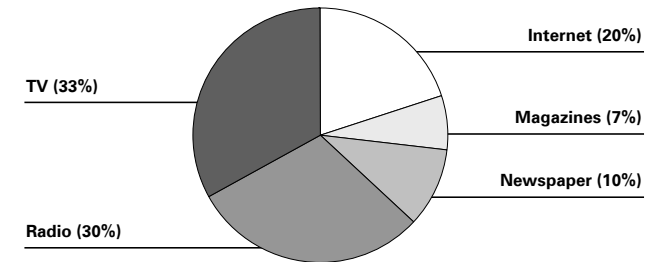
One reason for the recent high growth in broadband penetration is a significant decline in prices. In addition, bandwidth is increasing and flat rates are the standard offer today, which encourage customers to try out services and find the ones they want and/or enjoy. Additional reasons are increased marketing expenditures by operators and improved customer services, such as a less complicated and easier installation process.

Mobile Web – Finally becoming reality?

Wireless network technology and mobile devices are constantly developing. The promises of mobile data services have partially been realised over the last two years. As in the fixed Web, data rates have significantly improved with UMTS and HSDPA and will continue to increase in the future. These improvements enable better user experiences and thus increased usage of mobile Web services. This in turn enables a broad range of new services. Nearly every day some newly established Web 2.0 company launches a so called multi-access service which is targeted at users at home, their place of work, and while on the move. With higher download speeds and better device functionality, fixed Web services will be extended to the mobile world, adapted to the different formats of handheld devices where necessary, and new Web services that cater to the different environments of users when mobile will proliferate (e.g. highly location dependent-services are of greater relevance to mobile users than to fixed ones).

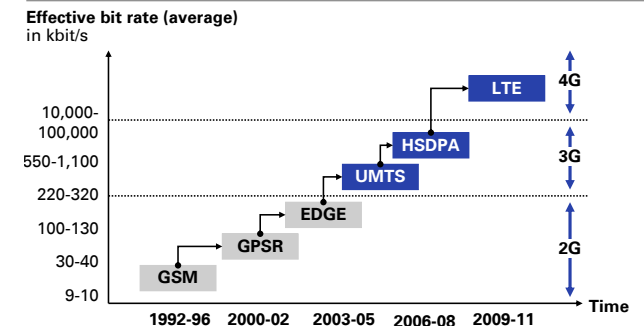
Sources: EITO, Arthur D. Little analysis

Media consumption in Europe (share of time budget)



Source: EIAA

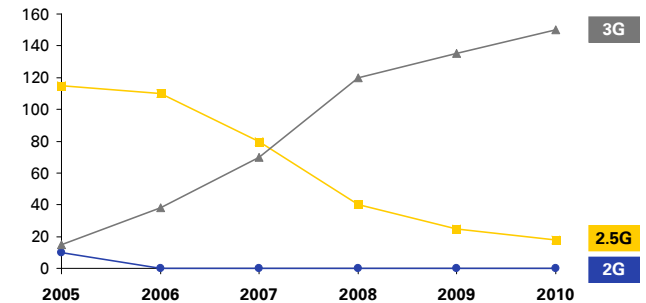
Development of mobile bandwidth



Sources: Merrill Lynch, Arthur D. Little analysis

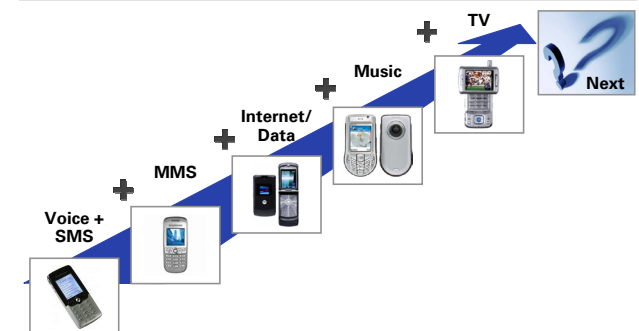
- The bandwidth for mobile networks is growing substantially. Today so-called third generation networks are becoming available with download speeds for a user of several hundred Kbit/s.; beyond 2010, LTE and other broadband mobile wireless networks will offer connection speeds of multi Mbit/s.
- Over 34.6m mobile subscribers in the U.S. accessed the Internet via their mobile devices in June 2006. In 2005, the most successful Web services were mobile information services. One fifth of all mobile phone users in Western Europe use these services at least once a month. Other popular mobile Web services are email, weather forecasts, gaming and banking.
- Today, 38% of Europe's 16-24-year-olds use their mobile phone, PDA or Blackberry to access the Internet and send or receive emails. This figure is expected to double as 39% of the non-users indicate that they plan to start using mobile Web services in the near future.
- Although the speeds of mobile Web access will continue to increase, we believe that fixed Internet access will stay ahead of mobile in terms of available bandwidth and also stay cheaper in terms of access cost.

Handset sales by technology in Western Europe (millions of units)



Source: Informa Media

Multimedia Devices



Source: Arthur D. Little

Mobile Devices – Mobile voice just one application amongst many?

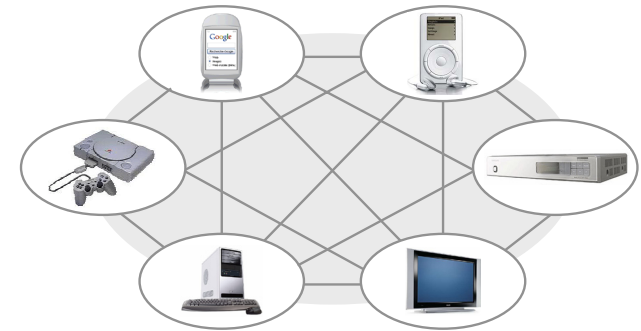
In conjunction with improvements in connectivity speeds over mobile and fixed Internet access, the development of mobile devices has made significant progress in terms of their convenience and capabilities. In addition, devices which until recently have only been used for a single purpose, are beginning to be employed for multiple applications thanks to enhanced access to the Web. Voice communication is still the most important feature of mobile devices but as more applications are assembled on them, they are becoming relevant in many different aspects of daily life ranging from voice communication to gaming, Web access, music and video playing.

- In 2007, 3G handset sales will overtake 2.5G handset sales in Western Europe. This means that the 3G-share of all the handsets sold per year will increase from 12% in 2005 to nearly 90% in 2010.
- Between 2004 and 2005, multimedia phone penetration in Western Europe increased from 49% to 52%. The increased share of multimedia mobile phones helps to stimulate the usage of mobile Web services.

Sources: Telephia, EIAA, Gartner, Informa Media, A.T. Kearney, Arthur D. Little analysis

- Since Apple introduced the iPod in October 2001, it has been dominant in the portable MP3 player market. Since its launch, more than 67m iPods have been sold. The total MP3-market is predicted to double in size in the next few years, from 140m units sold in 2006 to 286m in 2010.
- Today, there are two major portable video game devices on the market: Sony's Playstation Portable (PSP) and Nintendo Dual Screen (NDS). With these new generation portable video game devices, the gamers can connect to other gamers via WiFi, play together and chat. The WiFi feature also includes the possibility of surfing the Internet. The demand for PSP and NDS is huge. By (July 2006), more than 20m PSPs and 21m NDS had been sold.

Vision of future devices



- Interoperability
- Multi access
- Multi purpose

Source: Arthur D. Little

Conclusion

The Internet is becoming increasingly popular. With the increasing availability of broadband access, both fixed and mobile, as well as more sophisticated and powerful handsets for the mobile use of the Web, the path is set for additional growth. The users in different age groups use different Web services, and the number of active Internet users is still increasing.

Six years ago key technical prerequisites, such as sufficient broadband penetration, were not in place, so most Web services could not deliver on the promises they made. Today the fundamentals are there. As with most disruptive developments, some, perhaps most, of the services now springing up will certainly not survive for a long time. But some will and they will continue to drive the changes that are taking place which will reshape the industry landscape.

Chapter 2 – I thought we were talking about Web 2.0?

Increases in speed, multi accessibility and interoperability of devices as we have seen in chapter one will continue to drive Web usage into the mass market. But the Internet is developing in ways that are broader and more profound than increased speed and accessibility alone. People, as our example of Lisa shows, increasingly use the Internet to fulfil social needs. This increased social usage of the Web is one aspect of the development that has been labelled Web 2.0. This term has given rise to much heated discussion of whether it is just another marketing “buzzword”, or an indicator of a major transition or discontinuity to a new era of the Internet.

The “term”

The term was coined by Tim O’Reilly, who called a Web conference held in 2004 about the latest Internet developments Web 2.0. Since then, O’Reilly has published several influential works and is seen as the “father” of Web 2.0. There are many different and differing definitions for Web 2.0, but the “official” compact O’ Reilly definition is:

“Web 2.0 is the network as platform, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an “architecture of participation,” and going beyond the page metaphor of Web 1.0 to deliver rich user experiences.”

Another definition has been offered by Troy Angrignon, who defines Web 2.0 as:

“Web 2.0 is a group of economically, socially, and technologically driven changes in attitudes, tools, and applications that are allowing the Web to become the next platform for communication, collaboration, community, and cumulative learning.”

Most or many of the existing definitions of Web 2.0 contain partial elements of its meaning, but they do not present the complete picture, or provide insights into its relation to the past and to enduring human needs and attitudes which are not technology-dependent. Understanding the meaning and implications of Web 2.0 involves dealing with its several aspects which arise from very distinct sources. The following diagram summarises our perspective of these.

Exemplary Web 2.0 definitions

- “Connected Web”
 - “The improved form of WWW”
 - “Collection of technologies (VoIP, Digital media, XML, RSS, maps ...)”
 - “The two way web”
 - “A la carte, do it yourself platform”
-

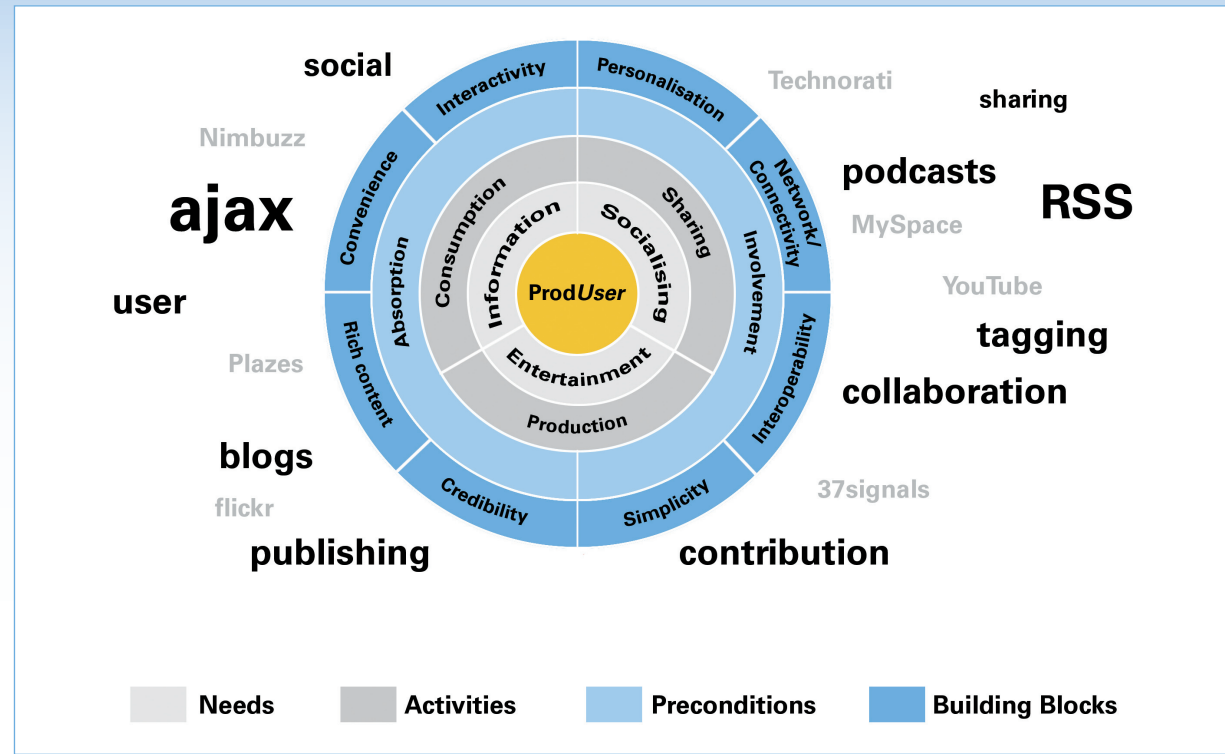
Statements about Web 2.0

- Power is moving away from the old elite (Rupert Murdoch, CEO NewsCorp.)
 - Our industry is facing a profound challenge from home-made content (Tom Glocer, CEO Reuters)
-

New Web principles

The look of the future Internet and how it will operate is driven by multiple forces. The main forces are user-related. Starting with the user, ARTHUR D. LITTLE has derived a framework that reflects the principles of Web 2.0 in its different dimensions.

Web 2.0 – Users at the centre



Source: Arthur D. Little

One of the major differences as compared to life before the bubble is that users now also become producers in the new Web world; **ProdUsers** do both, they **consume** content, and **produce** it as well, by writing blogs, uploading pictures and videos, or helping to generate knowledge (i.e. Wikipedia).

Web 2.0 Design Patterns

- 1) **The Long Tail**
Small sites make up the bulk of the internet's content; narrow niches make up the bulk of the Internet's possible applications.
- 2) **Data is the Next Intel Inside**
Applications are increasingly data-driven.
- 3) **Users Add Value**
The key to competitive advantage in internet applications is the extent to which users add their own data to that which you provide.
- 4) **Network Effects by Default**
Only a small percentage of users will go to the trouble of adding value to your application.
- 5) **Some Rights Reserved.**
Intellectual property protection limits re-use and prevents experimentation.
- 6) **The Perpetual Beta**
When devices and programs are connected to the internet, applications are no longer software artifacts, they are ongoing services.
- 7) **Cooperate, Don't Control**
Web 2.0 applications are built on a network of cooperating data services.
- 8) **Software Above the Level of a Single Device**
The PC is no longer the only access device for internet applications, and applications that are limited to a single device are less valuable than those that are connected.

Source: O'Reilly

- **Sharing** is not simply about exchanging thoughts and ideas, because today's Internet users want to take an active role in providing content on the Internet. Users share their knowledge, their time and interests with others, upload pictures and videos and update their blogs.
- The ProdUsers are fulfilling their needs (receiving information, communicating and socialising and entertainment) increasingly on the Web. While the Web was formerly mainly used for information and communication purposes, i.e. through e-mail or news sites, major new developments are to be found in the socialising and entertainment aspects located on many new Web services. Socialising has grown to be one of the key trends on the Internet today. Communities, such as MySpace, belong to the most visited sites on the Web. MySpace for instance was number 5 among the most popular Web sites in the US in June 2006 with 46 m unique visitors per month. People interact, date, meet new friends and socialise by chatting, blogging, commenting, discussing in forums and sharing content. The ten largest social networking sites today reach 45% of the Web users in the US.
- To make users return, Web services must **involve** and **absorb** users. This means that users can participate and add value to the service. Many services launched on the Web are still in beta and then, with the help of user feedback, the service is developed further. Users actually want to contribute to the services they use.

Out of these prerequisites Arthur D. Little derived some principles of Web 2.0:

- One key aspect is **personalisation**, the possibility for users to configure the information they want to see and also how it is presented to them.
- Next to personalisation, services need to be **credible**, so users will be confident that the information they share will be treated carefully. The credibility aspect also includes the targeting of the site towards the right segment.
- The **long tail** is an aspect of Web 2.0 related to the underlying business and service models. Through the Internet, it is possible to target services at user groups, which may be too small for traditional media channels. By addressing special interest user groups, Web services are able to target their services and their advertising specifically to these niche groups.
- The social aspect of Web2.0 services is represented by **Network/Connectivity**. Users want to find other users who share similar interests and find content relevant for them. Networks used to be about control, but today they are about sharing. They are open, and they are more about aggregation than distribution. The development of networks has thus shifted from a regime with little interaction among users to **Interaction** between users as the main

Web 2.0 key words

Underlying needs

- Sharing
- Consumption
- Production

Preconditions

- Involvement
- Absorption

Building Blocks

- Personalisation
 - Credibility
 - Long tail
 - Network/Connectivity
 - Interaction
-

Sources: Nielsen Netratings, Arthur D. Little

target. The value of the network increases with the number of users. Network effects from user contributions are therefore critical to success in today's Internet. Users should be given a platform where they can participate, share and contribute with each other.

- With the possibility of making services **accessible from multiple devices** and multiple means of access, the new generation of Web services is much more **convenient** to use and **interoperable** between different devices.
- **Simplicity** has become central to the Web 2.0 world. Troublesome registration procedures and unclear site structures that overload the user with information are not acceptable. Today's services on the new Internet must first of all be designed in a simple and clear way. Users should know intuitively why and how they should navigate the site. The convenience and simplicity aspects are also reflected in the changing way companies handle their intellectual property. While it was common to shut down every service that might be unlawfully using copyrighted content, content producers and service providers now actively try to find ways which allow the use of content. This change of emphasis marks a major shift in the policies of content providers and shows that a different understanding of the potential of Web services is emerging today.
- As opposed to the time when bandwidth was still a major issue, **rich content** is today a key differentiator for successful Web services. Content format has moved from simple text and animations to audio files, photos and videos, downloadable as a podcast, live streams or simply online viewing.

To sum up, a **rich user experience** in the terms just described is what differentiates Web 2.0 from the "old Web" which was very static and limited users to pure consumers. The most popular sites take into account the need for a rich user experience by integrating these features into the design of their service. Newly-started Internet sites have moved quickly up to the top of the list and attract tens of millions of Web surfers every month. These young Internet sites have all been able to integrate one or several of the important features which make Internet users come back to a Web site.

- User-generated content drives half of the top ten fastest growing brands in the U.S. The image hosting site ImageShack was ranked as number 4 among the fastest growing Web brands in July, 2006, increasing 233% from a unique audience of 2.3m (July 2005) to 7.7m (July 2006) Heavy.com, Flickr, MySpace and Wikipedia are the four other user-generated sites which all grew between 181-213% from July 2005 to July 2006 and attract millions of visitors every month.

Sources: Nielsen Netratings, Arthur D. Little

Web 2.0 key words

Building Blocks (continued)

- Accessibility from multiple devices
- Convenience
- Interoperability
- Simplicity

Key differentiates to the "old" Web

- Rich content
 - Rich user experience
-

- The top 10 social networking sites collectively grew 47% from April 2005 to April 2006. In April 2006 they achieved a unique audience of nearly 70m, reaching 45% of all active US Web users.
- Although the new category of user-generated content drives half of the top 10 fastest growing Web brands in the U.S., it is still Yahoo!, Google and Microsoft, companies Arthur D. Little refers to as Web incumbents, which attract the highest number of visitors. However, in comparison to the new user-generated Internet sites, growth for the incumbent sites is very small. For Google, the year-on-year growth in July 2006 was 23%, compared to only 8% for Yahoo and a decline of 5% for Microsoft.

Service categorisation

A wide range of new services integrating the design patterns of Web 2.0 have emerged. Most of the new services can be categorised into five main elements: Mashup & filters, social media, Web top, communication and multiclusters.

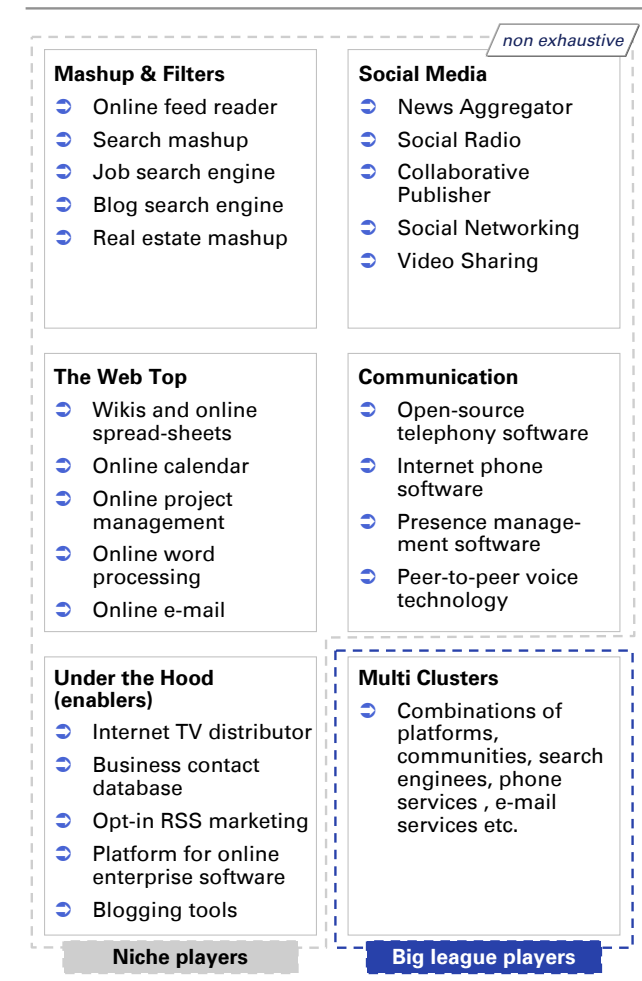
Mashup & Filters

Companies use content which is already present on the Internet, and present it in new ways. Users are able to customise their Web activities more than ever before. Examples of mashup & filter services are mapping mashups, video and photo mashups, blog search engines etc.

- Mashupfeed.com currently offers more than 940 different ways for mixing, matching or filtering Internet content.
- Mapits24, a German real estate search engine, was founded in June 2006 and is now listing more than 100k postings. On Mapits people can find out exactly where the real estate offer is located through an innovative search engine.
- Technorati is a Weblog search engine where users can search 51.5m blogs. Technorati was founded in 2002 and has about 4.5m visitors per month.

Sources: Nielsen Netratings, Technorati, Arthur D. Little

“Web 2.0” Services – possible clusters



Source: Arthur D. Little

Social Media

Social media services offer a platform for consumers to interact and meet new friends. Services range from special interest and social networking sites, blogs and photo sharing services to platforms which provide users with a Web space to present themselves.

- Flickr was founded in 2004 and offers its users the possibility to store, search, sort and share their photos online. On the site, users can also interact with each other sending messages and giving feedback. Flickr is today owned by Yahoo! and has more than 16.5m visitors per month.
- Probably the most famous example of a social media service is MySpace, as described above, with over 100m user profiles. Every user may create their own profile, look for friends, share news and photos or read blogs.

Web Top

Web top services offer Web based applications ranging from calendars to spreadsheets, reducing users' dependence on software installed on devices. Many of these "office" applications can be run online instead.

- There also exist Web top services such as wikis and online spreadsheets, calendars, project management, word processing, email, all of which are online based.
- Since 2004, Writely has offered a service to access and edit documents from any computer with Internet access. The service does not require any downloads, everything is done online. Writely was acquired by Google in early 2006.
- The question of which business applications are better suited to a Web-based implementation as compared to an in-house deployment is one that is expected to assume increasing importance in future. A range of considerations will enter into these choices (and should do so, since it is highly unlikely that all applications will or should migrate to the Web), such as security and reliability, extent of customisation, competitive and strategic value, costs, performance requirements (e.g. response time), frequency of need to update etc.

Exemplary Internet Activities

User needs are constantly driving the development of the Internet forward. Typical Internet activities which have gained importance due to users' needs are blogging, tagging and sharing.

Blogging

Web-logs started out as online-diaries and have become very popular. Every day 75k new blogs and 1.2m new posts are created. On average, it means that a new Weblog is created every second. Furthermore, 19.4 million bloggers, which represents 55% of the total, are still posting new information on their blogs three months after their blogs were created. The size of the blogosphere has increased sixty fold as compared to only 3 years ago.

Tagging

Tags are provided with keywords to describe the underlying content, such as photos, videos, blogs or entire websites. The tags are comparable to labels for making the content easy to find later. These descriptions are freely chosen keywords which the users select, instead of using rigid predefined categories.

Communication

Web 2.0-based communication services are voice (telephony) and messaging services which are based on the IP protocol, running on a PC or other fixed IP terminal or on mobile devices.

- Examples of communication services are open-source telephony software, Internet phone software and peer-to-peer (P2P) voice technology.
- Skype is a P2P IP-telephone company founded in 2003. It offers its users free calls to other users within the Skype network. For calls between the Internet and the public telephone network users have to pay. Skype has 113m registered users, the number of active users is estimated to be about 40m. In 2005, Skype was acquired by eBay for more than € 2.1b.

Under the Hood (enablers)

A growing number of companies are either offering Web-based platforms themselves on which other software and businesses can be built or developing basic tools that make some of the defining hallmarks of the Web 2.0 possible.

- Examples of under the hood services include InternetTV distributors, business contact databases, opt-in RSS marketing, platform for online enterprise software or blogging tools.
- Brightcove offers a video-distribution platform over the Web for producers, thus empowering content owners to reach their audiences directly through the Internet. Its customers include major broadcasting networks as well as small independent content producers.

Multi Clusters

Multi cluster companies combine some or all of the other clusters. These companies are usually the globally present players, which Arthur D. Little refers to as Web incumbents.

- In multi cluster services there are a wide range of combinations of platforms, communities, search engine, email service etc. The access to all these services generally only requires a single sign-in ID.
- Yahoo! provides services ranging from free email, search, chat, and news services to premium services, such as music downloads and dating services. With 412m unique visitors per month, Yahoo! generated a profit of \$ 1.5b in 2005.

Enabling Technologies

The increasing number of Internet users, rising broadband penetration, and extension of user needs and expectations have gone hand in hand with technology development. Three recent major Internet technology developments and trends are Ajax, RSS and Podcasting.

Ajax

Ajax (Asynchronous JavaScript and XML) is a development technique for creating interactive Web applications. Web pages feel more responsive by exchanging small amounts of data with the server behind the scenes, so that the entire Web page does not have to be reloaded every time the user makes a change. Users enjoy a better experience due to increased interactivity, speed, and usability.

Podcasting

Podcasting (iPod & Broadcasting) is a method of distributing multimedia files by downloading them to a portable player and letting consumers listen or watch where, when, and how they want, independent of a direct connection to the Internet at the time of consumption.

RSS

RSS (Really Simple Syndication) is a family of Web feed formats, specified in XML and used for Web syndication. Content from Websites can be distributed outside a browser. RSS is used (among others) by news sites, Weblogs and podcasting. Via pull technology, RSS enables a high degree of customisation.

Conclusion

Web 2.0 is built up from Internet users who are actively contributing to driving its development forward. These Internet users have underlying needs in their daily lives involving communication, socialising, information and entertainment which, in combination with enabling technologies and new Web user activities, have influenced the design patterns of the new services. Through smart innovation, the successful players begin to offer converged services which are easy to use over the Internet.

As the various Web service categories address different user needs which have, in the past, been served by different players from the TIME-markets, several implications for these players arise from the growing use of Web services. But before addressing these implications, there needs to be an understanding of how these services actually work – a look at the business model.

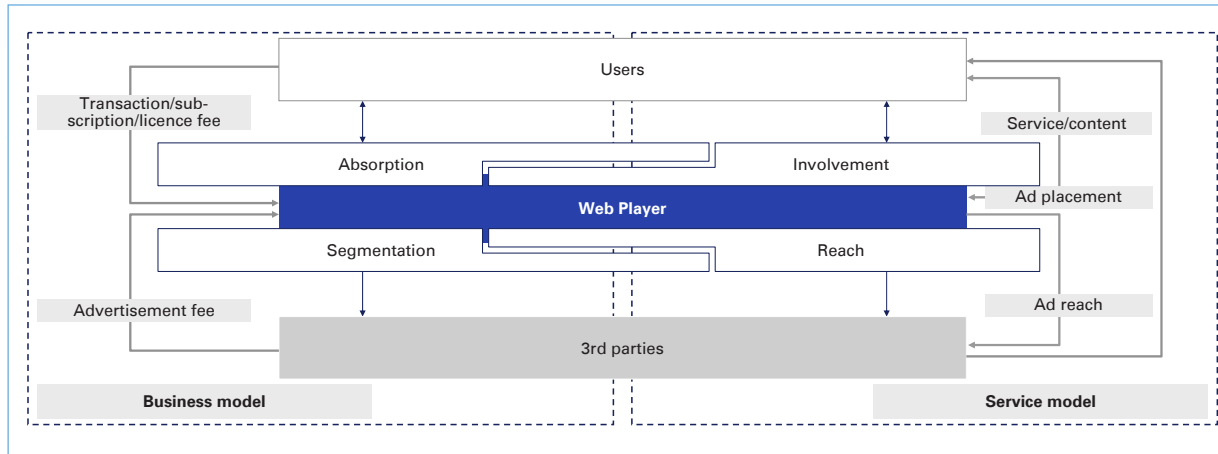
Chapter 3 Business models

Several different business models are available for Internet sites. As the momentum behind Web 2.0 has intensified, the introduction of online advertising has become the most attractive basis for a business model.

Business Models – It's all about advertising

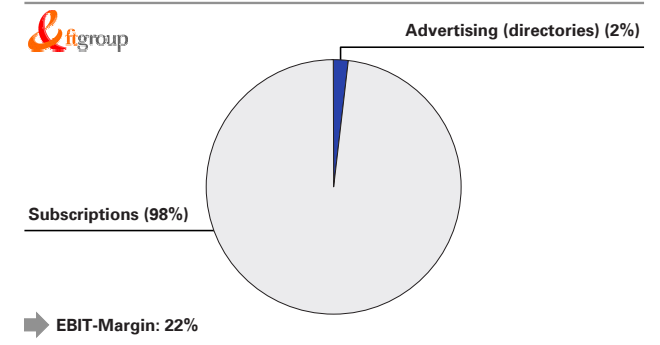
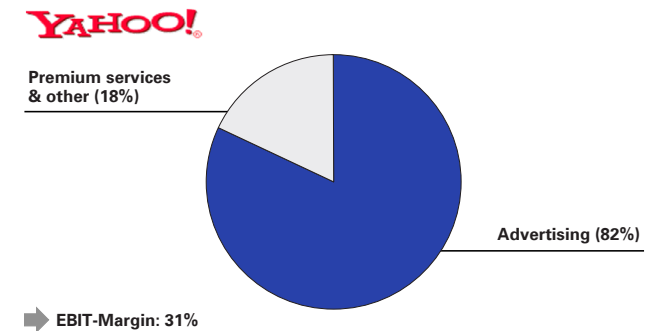
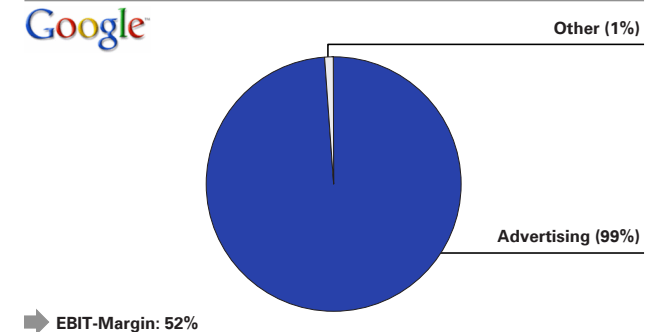
The success of ad-based business models is founded upon the mentality "for free" - a phenomenon which has become a widespread expectation not to say a key success factor for the uptake of sites among users. Users' attitudes about free content even for sophisticated services have been encouraged by the proliferation of business models based on advertising revenues. A new Web 2.0-phenomenon appears to be the notion of needing to provide privileged "free service" to non-paying users, while tolerating "mediocre" performance for contractually bound paid customer service relationships. This apparent paradox results from the impact of downtime in terms of lost revenues to the businesses paying for advertising to audiences who are often very fickle, and will abandon a site which is not responsive, or whose accessibility is unsatisfactory.

Separation of business and service model



Source: Arthur D. Little

Comparison of revenue sources/margins (2005)



Sources: Company data, Arthur D. Little analysis

Advertising models have always been popular on the Internet. After the dotcom bubble burst, the size of the European online advertising market consequently declined in 2001 and 2002. But in 2003, the popularity of online advertising among European advertisers returned. During 2005 spending levels grew by nearly 26%. The US experienced the same positive development, but at an even higher growth rate, reaching almost 30% in 2005. In 2006, total advertising expenditure in Western Europe is expected to grow at 5%, whereas total growth will be 4.5% in the US.

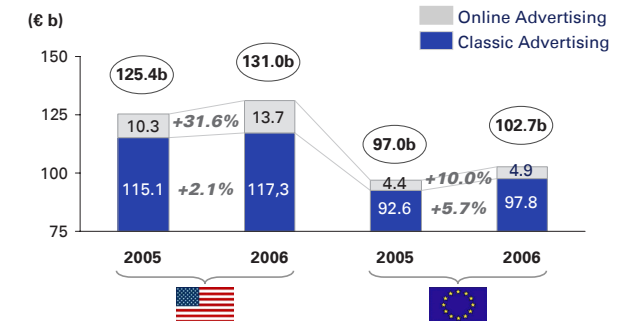
- To maximise the Web traffic, reach is especially important for sites which use online advertising as they are often paid per click. A major reason for the boom of online advertising spending is that advertising is the main revenue model on the Internet today, encouraged by the prevalent “for free” mentality among users for content.
- The advertising model is often used in combination with one or several other business models. An ad-based business model can only be implemented after a high level of traffic has been obtained. This means that many Web pages are frequently launched as a totally free service.

Five major business models are found on the Internet:

- **Advertisement Based:** The Web site provides content and services for free to customers; the services are paid for by third party advertisers. The advertising model works best when the volume of the site traffic is large or highly specialised. This is the most common model for Internet sites today, and is often seen in combination with other business models.
- **Transaction Based:** In the transaction based business models, the site or service brings buyers and sellers together and facilitates transactions. For each transaction the broker enables it usually charges a fee or commission.
- **Infomediary:** In the infomediary business model, the service collects data and consumption behavior from its visitors and sells on to buyers or sellers who want to understand a given market.
- **License Based:** Users are charged for one time usage or time-restricted usage of (premium) applications or content.
- **Subscription Based:** Users are charged a periodic fee in order to use the Web service. The subscription model often includes advertising and is frequently used by community based services as well as by some publications (e.g. newspapers) where basic content is free but premium services require a subscription.

Sources: Initiative, Arthur D. Little

Ad Expenditure for US & Europe



Sources: Initiative, Arthur D. Little analysis

Types of business models

- Advertisement Based
- Transaction Based
- Infomediary
- License Based
- Subscription Based

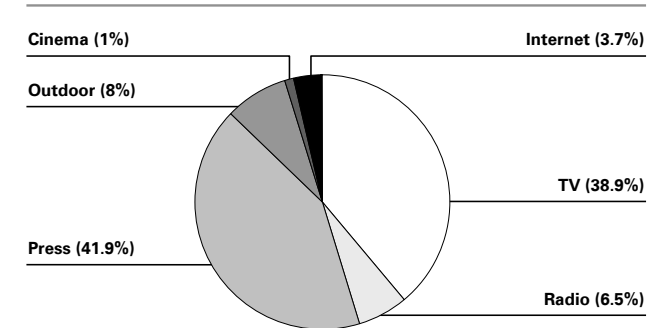
Online Advertising – A challenge for traditional media

As online advertising increases in popularity, it increasingly challenges traditional media formats. After TV, radio, press and outdoor, Internet is the fifth largest and fastest growing medium in Europe.

- Total online advertising expenditure in Europe grew 25.5% from 2004 to 2005.
- The largest online advertising markets in Europe are the UK, Germany and France. These markets account for more than half of the total European online market.
- The UK has the leading position with nearly € 1,939m advertising spending in 2005. France had the largest growth of Internet ad spending in 2005 at 66%. On a European level, despite the high growth of Internet advertising spending, the medium is still rather small. In 2005, Internet advertising spending in the UK was 7.8% of the total advertising budget. For France and Germany, this share was 5.9% and 4.4%, respectively.
- On a global level, the US online advertising market is the most highly developed and sophisticated. Internet advertising expenditure is expected to account for more than 10% of total advertising spend in 2006, and the year-on-year growth will exceed 30%. With 285m inhabitants in the U.S. and 460m Europeans, US online ad spending (per inhabitant) is nearly 5 times higher than in Europe. The U.S. is also the first market where the Internet advertising share is soon expected to overtake radio.
- Online advertising has immense growth potential. In Europe, people devote 20% of their media consumption to the Internet. In contrast Internet advertising spending amounts to only 3.7% of total advertising expenditure. Increasing Internet usage and broadband penetration will further help to drive online advertising spending.
- Online advertising in Europe is predicted to grow 41% from 2005 through 2008. The growth of online advertising spending in the US during the same time period is expected to be 74%.

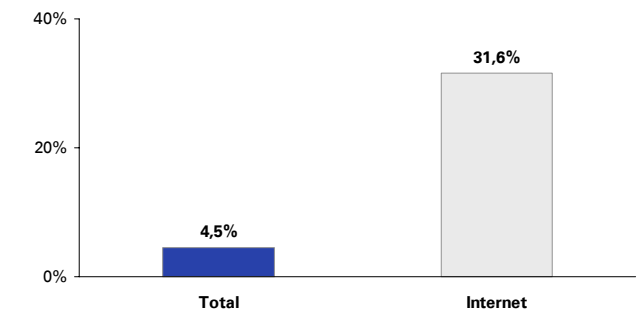
Sources: Jupiter, eMarketer, Initiative, Carat, Arthur D. Little analysis

Advertising share by medium in % of total market size (Europe, 2006)



Sources: Initiative, Arthur D. Little analysis

Ad expenditure growth (2005 - 2006)



Sources: Initiative, Arthur D. Little analysis

Different Forms of Online Advertising

Internet advertising can be divided into three categories; display ads, search engine marketing and classifieds. Two major trends for the different forms of online advertising are the boom of rich media and search engine marketing.

- **Rich media** is booming in Europe. In 2006 it will represent more than one third of the on-line advertising market. Video and audio ads are frequently used on major European online news sites and by major companies. As broadband penetration in Europe continues to increase, rich media ads will be executed with fewer interruptions.
- Although **pop-ups** are diminishing, banner ads are still widely used. As rich-media grows, it will cannibalise static display advertising such as banners.
- **Search engine** advertising is also widely used, but its potential for growth is inhibited by the European multi-lingual environment. Still, the size of the search engine advertising market in Europe is expected to reach € 3bn by 2010, an increase of 114% from 2005's € 1.4bn. The same figure for the US is expected to grow from € 3.4bn in 2005 to € 6.1bn in 2010, representing a growth of 79%. US search engine market share was highest for Google at 48%. Yahoo and MSN had market shares of 22% and 12%, respectively.

Online advertising is based on the following cost models:

- **CPC, Cost-per-Click:** Every time somebody clicks on the advertisement the advertiser is charged. This model is mostly used by search engines. Click fraud, in which for example a company or a malicious user may try to increase the costs of a competitor by registering multiple non-productive clicks on its advertisement, has become a visible problem which search engines are devoting efforts to detecting so as to minimise unjustified inflated billing to their clients.
- **CPM, Cost-per-Mille (Mille=1000):** Advertiser pays for exposure of their message to a specific audience, often in 1000s. CPM is often used for display ads & rich media.
- **CPA, Cost-per-Action/Acquisition (also cost-per-order (CPO) or cost-per-sale (CPS)):** Advertiser pays on the basis on the number of actions the advertisement generates (purchase, downloads, registrations etc.). This approach has been gaining interest as it is directly linked to revenue generation for the advertiser.
- **CPL, Cost-per-Call:** Advertiser pays publisher a commission for phone calls received from potential prospects as responses to a specific publisher ad. This model is very new and still in its infancy.

Sources: Forrester Research, Jupiter Research, Arthur D. Little analysis

Types of online advertising

Display Ads

- Banner ads, pop-ups and rich media. Rich media is interactive ads which are mostly based on Flash

Search Engine Advertising

- Advertisers invest in search engine optimisation in order to make it easier for the customer to find the company's homepage. It also includes sponsored links and paid inclusion

Classifieds

- Posting of advertisement on Internet listings, compare with the Yellow Pages

Source: Arthur D. Little

Online advertising cost models

- CPC, Cost-per-Click
- CPM, Cost-per-Mille (Mille=1000)
- CPA, Cost-per-Action/Acquisition (also cost-per-order (CPO) or cost-per-sale (CPS))
- CPL, Cost-per-Call

At the top: Smart innovators – Successful implementation of ad-based business models

Google – Multi Cluster

Google, by introducing new advertising formats such as AdWords and AdSense, has become an extremely profitable company. In 2005, 99% of the company's total revenue of € 5b was made up from advertising revenue. Its net income for the same year was € 1.2b. Google tries to stay in the forefront when it comes to Internet advertising by constantly renewing and innovating its business.

- Google will start trying out the new CPA network for its AdSense customers. Instead of advertisers paying per click, they will now pay per action, which means paying only for clicks that lead to a sales lead or even a sale. This can be seen as a way to solve the problem with click fraud, which Google, MSN and Yahoo are all facing.
- Two recent major deals made in August 2006 are Google's cooperation with eBay and Viacom. On eBay's sites, (excluding the U.S.), Google will display so called "click-to-call" text ads. When the customer clicks on the ad, the Skype and GoogleTalk services will link the seller and the potential buyer together in a VoIP call. Through the deal with Viacom, Google will get video content which they can distribute on the huge advertising network. The revenue will be split between Viacom, Google and the site owner who displays the video.

MySpace – Social Media

Before Rupert Murdoch bought MySpace for € 472m in July 2005, MySpace was not focused on a solid revenue model. In August, 2006, however, MySpace signed a deal with Google worth € 733m. MySpace will use Google's search engine, and let Google place relevant text advertisements on the site. With a member population of 100m and another 230k new members signing up with MySpace every day, there is significant potential to develop the cooperation with Google and to initiate deals with other parties.

Another recent business initiative by MySpace is to offer unsigned music bands the capability of selling their music directly to MySpace users. In cooperation with SnoCap, MP3s will be offered without copy protection of any kind.

Runners up



Social networking sites for students.

➤ www.studivz.de



Social networking site.

➤ www.facebook.com



Social search site with possibility to get help from other people sites for students.

➤ www.chacha.com



News site; news with the most votes get displayed on the homepage.

➤ www.digg.com

YouTube – Social Media

Currently, more than 100m videos are viewed on the site on a daily basis. This heavy traffic demands bandwidth and service costs are estimated at between € 245-325k a month. In October 2006, YouTube was acquired by Google for €1,300m in a stock-for-stock transaction.

It was not until August 2006 that YouTube started trying to earn money with new online advertising formats such as “branded content channels” and “participatory video ads” allowing advertisers to customise their own space on YouTube to attract people with contests and videos. Some channels could even operate like television, with advertisers offering programming as a sponsor.

Trends in Online Advertising

One of the big advantages of online advertising is due to the fact that advertisements can be targeted much more efficiently and precisely on the Internet than with traditional advertising methods. With online advertising, it is possible to reach target groups on their favourite sites. These days, as consumers increasingly demand and respond to personalisation, Internet advertisers try to follow this trend by developing new ad formats and ways of integrating the users into ad placement, tracking and even ad distribution. Among these trends, personalisation and localisation are the most important. The idea of involving users as distributors and advertisers for new services/products is referred to as viral marketing or “word-of-mouth advertising”. Viral marketing is a strategy that encourages individuals to pass on a marketing message to others.

- 81% of consumers are interested in receiving personalised content, such as music and book recommendations. 64% of consumers would provide insights into their preferences in exchange for personalised product and content recommendations. Regarding online advertising, more than 50% of Web users would prefer a banner ad targeted to their interests rather than a generic one. These attitudes and trends among Internet users offer new opportunities for advertising characterised by localisation and personalisation.
- With Google’s AdWords program, advertisers can select the geographic area where an ad should appear on the user’s computer screen. Depending on the country, it is possible to specify the area or areas where the advertisement should appear. This segmentation can be made for individual states, cities, ZIP or postal codes or even a radius around a specific location.
- For personalisation, Google’s Gmail offers a free email service backed up by advertisements which are contextual, relevant to the content in the email.

Sources: ChoiceStream, Arthur D. Little analysis

Runners up



Video, Photo and Audio sharing over users’ harddisks.

➤ www.pixpo.com



Video sharing platform.

➤ www.myvideo.de



Flash based video site.

➤ www.neave.tv



Site for unknown music bands. Initially, music is free. Price increases as popularity of songs grows.

➤ www.amie.st

New advertising formats

As Web 2.0 has developed, so have the advertising formats. Today, several new advertising formats can be seen on the Internet. Four of them are especially relevant to future business models:

- **Video advertising** on YouTube – In August 2006, YouTube introduced “branded content channels” and “participatory video ads” with the goal of finding a better balance between online advertising and creative approaches that bring consumers into the process. With a branded content channel, advertisers can customise their own space on YouTube to attract people with contests and videos. Participatory video features one daily video ad on the home page that users will judge. The introduction of video advertising seems to have been a great success for YouTube. Paris Hilton’s participatory music video ad had 100,000 views within 12 hours, and her brand channel had over 1,600 subscribers. Dimensions Films’ participatory video ad of the new movie “The Pulse” had 900,000 views within 10 days. In the US, VoD (Video on Demand) advertising spending was forecasted to reach € 261m in 2005, up by 75% from 2004. In 2006, the growth is expected to be 42%, reaching € 370m.
- **Blog advertising** on Washington Post – Washington Post has launched a brand new program “blogroll” that helps marketers find blogs on which to advertise. Advertisers can browse the network and find blogs to advertise on within their interest areas. The bloggers and the Washington Post split the advertising revenue. Bloggers who opt into the program earn money but also get a rotating link to their site in a sponsored Blogroll box that sits right on the Washington Post homepage. In the U.S., an estimated \$ 28m is spent on blog ads; it is forecast to reach € 244m in 2010.
- **Podcasting advertising** – Napster launched the first podcast ad in Germany, delivered on the platform of a group of 20 podcast producers. Within the trial period 70.000 users downloaded the sponsored podcast. In Germany alone, in May 2005, 3.2m podcasts were downloaded, an increase of almost 200% as compared to the year before.
- **User generated advertising** on Kayak – Kayak encourages user-generated content and launched an advertisement contest. Consumers use Kayak’s Ad Guru Tool to create their own trip idea ad with photos and copy. The winner gets the chance to produce the ad with the help of professionals. The ad will then be used in both online and offline advertising.

Source: Arthur D. Little analysis

New ad formats

- Video advertising
- Blog advertising
- Podcasting advertising
- User generated advertising

Example of user generated advertising



Kayak is a travel search engine where users can find travel products from travel suppliers all over the world. Kayak’s revenue model is built on contextual adSense-like advertisements. Kayak also generates revenue when users click on the search results of its travels partners, such as airplanes, hotels and rental car companies.

➤ www.kayak.com

Venture Capital – high hopes again?

When talking about business models, it is worth taking a look at the venture market. It is no secret that many of the newly established Internet sites receive funding during the first couple of years even without generating substantial revenues. Many companies are also founded with the objective of being sold after a certain time frame; if the company is able to get a large user base, revenues are not the most important factor. The amount of funding or the number of companies funded gives a good insight into the well being of the industry as a whole.

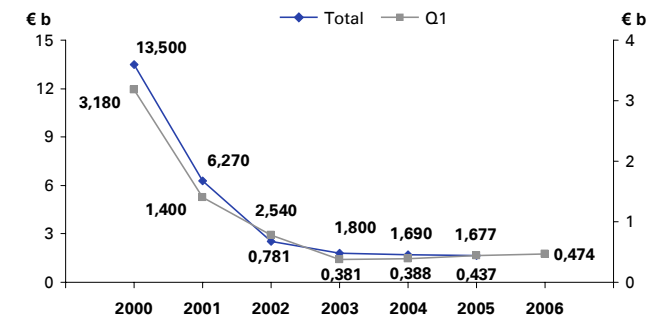
Let's take a look back: The year 2000 was a record year for venture capital (VC) investment. In Europe VC-firms invested more than € 22.2b. In the US, the same figure was nearly € 77b. Most of these investments were put into young companies with unproven business models. Many of the young, often IT-focused, companies presented visions of huge future growth but could not deliver on the promised revenue potential. The investment bubble burst, and by 2003, VC-funding had dropped to € 3.6b in Europe (-83.8%) and to € 15.5b in the US (-79.9%). How does it look today?

IT(Information Technology)-investments – rising again at a more cautious and realistic level!

- ➔ Investments in the IT-sector in Europe have declined, but it is still the most popular sector to invest in. In 2005, 43.6% of the total amount invested by venture capital was in the IT sector, compared to the year 2000 when nearly 61% of all investments went into IT. IT is also the most popular sector for American investors. In 2005, 54% of the total amount raised for venture capital was for IT, 9 points lower than in 2000.
- ➔ After the dotcom crash, the levels of VC-investments in the IT-sector in Europe and the US now seem to have stabilised. In Europe, investments in IT were € 474m in the first quarter of 2006. This is the highest amount raised in the first quarter since 2002 at € 781m. The same development can be seen for the US. For the first quarter in 2006 these investments were € 2.74b which is the highest amount during the first quarter since 2002 at € 3.23b. These numbers are far below the peak reached in 2000, but they represent a more sustainable pace of funding for venture investors and indicate a more reasoned approach towards and by the companies in which they invest.

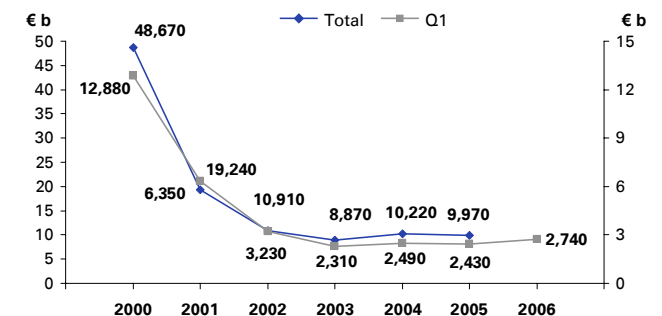
Sources: Ernst & Young, Arthur D. Little analysis

Venture capital investments in IT – Europe



Sources: Ernst & Young, Arthur D. Little analysis













Venture capital investments in IT – US



Sources: Ernst & Young, Arthur D. Little analysis

- However, the development of the number of deals shows a different pattern. For Europe, the number of deals has declined every year since 2000. In 2005, 573 deals were made in contrast to the highest number of 2,161 in 2000. And the latest numbers from the first quarter in 2006 show a continuation of the decline. Only 107 deals were closed during the first quarter of 2006 compared to 137 during the same period the year before.
- The development in the US is different. Although in 2005 the number of deals (1,427) was somewhat lower than the year before (1,436), it was still close to the figure of 2002 (1,464). In the first quarter of 2006, the highest number of deals since 2002 was made, 356 compared to 385.

Selected recent Web 2.0 deals

Company	Homepage	Country	Description	Price (€ m)	Investor
	www.skype.com	US	IP-telephony	2,120	eBay (Acq.)
	www.youtube.com	US	Video sharing platform	1,300	Google (Acq.)
	www.myspace.com	US	Social networking	472	News Corp. (Acq.)
	http://get.ampd.com	US	Mobile Web 2.0 services	122	12 VCs
	www.mobitv.com	US	TV & digital radio services for mobile phones	57	1 VC
	www.grouper.com	US	Video sharing platform and editing software	53	Sony Pictures (Acq.)
	www.navio.com	US	Internet and mobile e-commerce technologies	21	3 VCs
	www.flickr.com	US	Online photo sharing	12 - 16	Yahoo! (Acq.)
	www.facebook.com	US	Online directory that targets students	13	1 VC
	www.1ktv.com/	US	On-demand customised multimedia content to mobiles	12	2 VCs
	www.sixapart.com	US	Internet Web-blogging software and services	10	4 VCs
	http://del.icio.us/	US	Online tagging	N/A	Yahoo! (Acq.)

Source: Arthur D. Little

Viable business models?

Some of the services on the Internet with a large user group and interesting service offerings avail themselves as potential takeover candidates for companies wanting to enter the market

Google™ Acquisitions by Google (Excerpt examples)



Source: Arthur D. Little

Conclusion

All the examples of today's smart innovators illustrated above have business models which are mostly based on advertising. To be dependent on advertising implies that the long tail of users has to be addressed. To reach as many Internet surfers as possible is key, which means that there must be a balance between the amount of revenue the advertising brings in and the amounts and types of advertising users are willing to accept on the homepage. At the same time, Internet sites have to take the extensive "for free" mentality into account. Users are nowadays used to obtaining what they want online for free, which must nevertheless be paid for somehow if viable business models are to be established and survive. Advertising is one major avenue for generating the revenues that Internet sites need for this purpose. But if a site has too much or too intrusive or unwelcome advertising which adversely affects the users' experiences, there is a risk that they will start using another similar service which has found a more acceptable balance between convenient and enjoyable access to content users want, and mechanisms for ensuring that it is an economically viable enterprise.

A look at the VC market reveals that hopes in this newly established Internet market are rising again. This time, the hopes are combined with a little more caution than in the bubble days of 2000. But nevertheless, one has to be careful not to create another bubble, as today money from these new services is mainly derived from advertising. Ad-only business models may only be sustainable for a limited number of companies.

Chapter 4 – What to make of this

Recap: Users have developed certain habits and behavioural patterns which are reflected in services and the way these are presented on the Web

- *Users have become prodUsers.*
- *Users use the Web not only for information but also to fulfil certain social needs.*
- *Web service providers not only address the needs of anonymous users but rather try to fulfil the specific needs of different user groups.*
- *Web service providers involve users in content generation and thus make them part of their site.*
- *Web services become more and more convergent in terms of being accessible from different devices and different forms of access.*
- *The majority of new services are produced by a vast number of small, newly established sites. The big league players (Web incumbents) are very successful in monetising the new services.*

Seeing all these changes taking place today, Arthur D. Little believes that, although the term Web 2.0 has perhaps been overused, it still has to be seen as a paradigm shift and, most important, one that has only just started to take effect. Many of the sites and services described will not survive the next years because of a lack of usefulness or a solid business model. As most of the companies we have illustrated in this report believe in business models based on advertising revenues, the sites have attracted large volumes of traffic. With hundreds of new sites starting on the Web every day, it will be a challenge for many of them to become profitable on the basis of advertising revenues alone.

The “vision,” or is it?

We believe that the developments of the Web described here are irreversible. The ways in which its services are now being designed, and the involvement of users as participants in the process of service design, are making the Web attractive for mass markets. Today people between the ages of 19-25 are the ones who make up the major proportion of Internet users and both develop and use these services. In addition, advertisers will also change their ways of interaction with users and customers. Not only the young and innovative users will start to mash up the services they want, instead of using

How does it fit in?



Key questions to be answered?

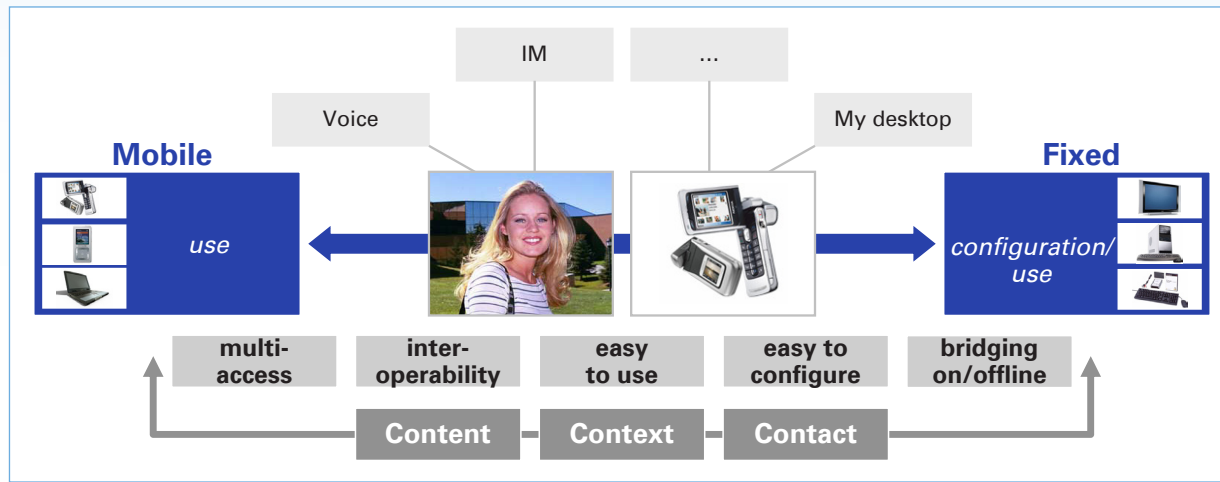
- Impact on TIME landscape
- Challenges, Threats and Opportunities
- Future moves of market participants
- Possible strategic directions

services based on distinct forms of access such as traditional voice telephony or television, that are limited in their functionality as well as in the possibility to access them from multiple devices.

A strong push and pull will come also from multi-accessible devices. Advanced mobile phones already offer WiFi access and can handle different services and file formats. With multi-access devices, users are able to choose the mode of access which most suits their needs in different locations: using the 3G and 3G+ mobile networks while on the move, or accessing the Internet from a hotspot or via a wired connection when in locations which are so equipped. Given the flexibility to access services through multiple means, consumers are able to use their favourite services wherever they are. Web services, such as blogs or file sharing services are already accessible from many mobile phones and the personal computer at home. The same is true for communication services. While instant messaging was limited to a fixed Internet access until a couple of years ago, these services are now starting to become popular for mobile phones. Skype is already offering its software on PDAs and a few mobile phones; additional devices will follow.

To sum up, with the growing possibilities of Web services and the continuing convergence of fixed and mobile, users want to get the best of both worlds in the future:

A “vision” for future communication – Best of two worlds



Source: Arthur D. Little

By combining the best of both the fixed and the mobile Web, users will be able to access the content they want in the context they need and always stay in contact with their friends and family.

Future communication requirements

- Access the same community **via the mobile** and fixed Web.
- Using different **devices** to access favourite services, such as mobile phones, mp3 players, laptops, PC or TV.
- Personalised and convenient features depending on the form of access and device – the possibility to mash up services according to personal needs and requirements.
- Configuration and use from the fixed Web, mainly use from the mobile Web due to device limitations concerning input and output capabilities (screen, keyboard).
- Having access to personal data, such as address books, important documents, buddy lists and calendar.
- Bridging off and online worlds

Pushing convergence – Web services are taking the lead

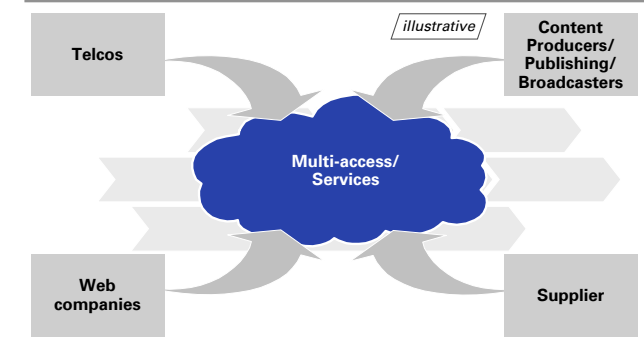
Mobile and fixed operators, cable companies and media players have not been very successful in driving TIME convergence over the past few years. They have been remarkably passive since the dotcom bubble burst in 2000. The last big initiative, the fixed-mobile-convergence for voice communication will require more efforts. Now Web 2.0 players are taking the lead and pushing convergence on the services and content level. The number and variety of services are constantly increasing.

- With Skype Mobile, Skype has taken its first move from fixed access to mobile access. Whenever users have a WiFi or 3G connection, they can make calls and chat for free. In September, 2006 Skype announced the introduction of the world's first cordless DECT phone that can make Skype Internet calls without being connected to a personal computer.
- Nimbuzz offers its users free instant messaging on selected mobile phones as an alternative to text messages. The service integrates instant messaging from Google and MSN.
- By offering branded content channels for advertisers, YouTube is taking IPTV to the next level. Users can choose freely which videos they want to watch, and the objective is to make every music video ever produced available within the next 18 months.
- Apple has started a video download service where users can download films through the iTunes portal.

This Web-service-driven convergence will have consequences for the traditional value chains of the TIME-markets. While value chains for the different segments have remained largely distinct until today, the borders will soon become blurred.

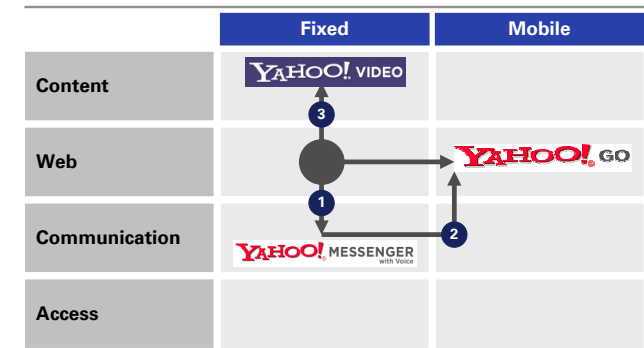
Some parts of the value chains, consisting of the infrastructure needed for providing the services, will be less dramatically affected than others. But the service elements of the different value chains concerning content production and distribution as well as service provisioning will be transformed.

Moves of TIME players towards convergence



Source: Arthur D. Little

Exemplary moves of Web players



Source: Arthur D. Little

Telcos (fixed/mobile)/ Cable companies – Communication breakdown?

The Telco operators are the first to feel the impact of the new Web services, as these started to offer communication services, such as VoIP or IM from Skype or Google Talk. As a result, these services start to destroy value for the telecom operators, as the services offered by Skype or comparable players are either free or offered at very low prices. More intense competition between telecom operators and Web service providers will emerge, and both network operators and Web service players are likely to push convergent communication services further.

In the future the question will be, whether operators become distributors delivering services offered by third parties (Web player, content player) or become warehouses delivering own enhanced products and services and combining these smartly with services offered by other companies. The decisive factor will be the ability to attract users with a balanced service portfolio and to keep them on the platform.

Fixed telcos

Fixed telco players have been the first to be affected by the services offered by Web players. Instant messaging and VoIP are the major threats for the traditional voice services offered by fixed telecommunication providers. As many of these services are offered for free (from a user's perspective), it is not a matter of generating additional revenues, but rather of maintaining a direct user/customer relationship. The value destruction is inevitable and hard if not impossible to stop, because VoIP services such as Skype or Jajah do not only offer free calls, but they also provide extra features such as IM and "friends online". The user relationship may eventually be monetised through the sale of premium services and/or targeted advertising.

- ➔ There is a manifest threat that fixed telecommunication providers will be reduced to pure "bitpipes", limited to providing Internet access to their customers.
- ➔ It is questionable whether triple play offers will really help in counteracting the effects of the continuing substitution of traditional telecommunication services, as triple play success is very country-specific and depends on customers' willingness to pay for TV services which is very variable given the diverse broadcast market environments in different countries.

What's next – IMS?

The separation of access and services through IMS (IP multimedia subsystem) allows the deployment of new and richer IP-based services without the need for integration with the network. Operators can launch new services more rapidly and less expensively than before.

IMS can be viewed as network operators' most recent initiative in the perennial battle to secure an important role for network intelligence (i.e. value-added) in contrast to the opposite extreme of "intelligence at the edge", with devices connected to a so-called "dumb network" and would reduce operators to bitpipes.

The full potential of IMS depends on its supporting true multimedia – VoIP, messaging, music, video, gaming – the full spectrum of services enabled by IP networking. If IMS fulfils its promise it will enable network operators to evolve new business models which give them more options than just becoming highly efficient, low cost operators of bitpipes. The bitpipe scenario would leave all or most services and their creation to the edge of the networks, which will be dominated by media companies and Web players such as Google.

Operators will face the choice between

- ➔ Using IMS to perpetuate "walled gardens", by means of IMS islands which inhibit other services providers from accessing their subscribers and the subscribers themselves from accessing all the services in which they are interested.
- ➔ Or teaming with third party service and content providers to offer more services, innovation, and content than any single operator can possibly deliver on its own.

Mobile telcos

The main difference between mobile telecommunication providers and fixed network operators in terms of their value chains is the degree of control the former enjoy over end user devices. By subsidising these devices, MNOs (Mobile Network operators) are for the moment still able to influence the development of mobile services. Many follow a “walled garden” approach, letting their users only choose from among preconfigured content and services. This approach may work for a few more years, but eventually mobile operators will have to open garden gates and let users mash up the services they want. Once one competitor or an MVNO (Mobile Virtual Network Operators) does this, the the ability of the others to maintain the “walls” will crumble.

- With rising penetration rates of mobile broadband and continually improving handsets that allow users to download software and applications to their mobile devices, it will only be a matter of time before the services and behaviour patterns of the fixed Web spread to mobile devices.
- There is a distinct threat that mobile operators will lose their long cultivated customer “ownership” to Web service providers – Web services, such as nimbuzz are already pushing in this direction.

Cable operators

The Cable operators’ value chain is similar to that of fixed/mobile network operators concerning infrastructure. The differences between cable operators as compared to telecommunication providers are that

- Cable operators tend to fall into one of two extremes, either being basically already bitpipe providers, sending the signal to households but not offering any additional services, or operating with-in large media companies which also own content programmers (e.g. the large U.S. MSOs) and have extensive experience in negotiating with content owners, and then aggregating, and marketing “packages” of video entertainment.
- Cable operators are not involved in offering mobile services, although this is beginning to change in the direction of so-called “quad play” (video, broadband internet access, fixed voice and mobile voice) thanks to alliances with mobile operators, such as that between Sprint and several cable MSOs in the U.S. and the acquisition of the Virgin MVNO by the U.K. cable operator NTL Telewest.

Cable operators offering Internet access are being challenged by combined fixed and mobile offers from integrated telecommunication providers at the same time as they themselves are invading the traditional territory of telephone companies with their own, largely VoIP-based voice services. For example, three large U.S. MSOs have now reached the level of 1 million VoIP subscribers, Comcast recorded its one millionth VoIP customer in August, 2006 and Cablevision in July, 2006, while as of September, 2006 Time Warner is approaching the 2m level.

Innovative companies & services



Jajah offers voice telephony to registered users through existing telephones. The company just launched a special service for low-cost mobile voice calls.

➔ www.jajah.com



Short message service based in England, which offers users the ability to send and receive short messages over the GPRS network. Length of messages is effectively unlimited and at a fraction of the cost of standard text messages.

➔ www.hotxt.co.uk

Content providers – Get the picture?

Content producers

For content producers, the developments of the Web present both opportunities and threats. While content producers have traditionally sold their content to different aggregators with exclusive rights for certain territories and/or for a specified time frame, the ubiquity of the Web will encourage efforts to protect intellectual property to maintain the value chain, as consumers will increasingly be able to buy and consume their favourite content whenever and wherever they want, without regard to geographic territories or the time-dependencies of contracts. In principle, once content is made available anywhere at some point in time, it can be made available everywhere else from that moment on.

- The opportunity for content producers is to sell their content directly to customers over new channels, which may compete with (e.g. video-on-demand versus DVDs (bought and rented)) as well as complement existing distribution channels.
- But content producers face increased competition from consumer-created content, which is mostly available for free on the Internet, supported by ad-based business models.
- For example, NewsCorp has already reacted to the changes taking place and bought MySpace.
- In September, NBC announced that some of its new prime time shows will stream for free beginning in the fall of 2006.
- In June, Disney's ABC started a trial to offer some of its Television shows as free downloads over the ABC webpage. In September, the offer was continued. The free downloads are supported by advertising.
- Viacom bought Atom Entertainment. With the deal Viacom hopes to get a share of the popular online video business.

Television/Radio operators/Publishers/Broadcasters

Broadcasters, such as television stations, face the threat of finding their role in the value chain substantially reduced. With users able to mash up the content as they wish, demand for edited content may decrease, although it is unlikely to disappear completely, as many people prefer just to be entertained at some times without having to exert any conscious effort of their own.

Innovative companies & services



Community to promote unknown artists. If 5,000 fans are willing to spend \$10 each, music bands may go to a studio and record an album. Each user investing \$10 will get a copy. The music is also available for download on the website.

➔ www.sellaband.com



Videosharing community that pays. Revver attaches ads to the end of uploaded videos. When someone clicks on the ad, Revver shares the revenues 50/50 with the user who uploaded the video.

➔ www.revver.com

In addition, as many content producers are beginning to sell/market their content directly to consumers, pure aggregators will face stiff competition.

Some broadcasters and TV-operators are reacting to this development by moving towards Web services.

- The German TV-broadcaster RTL has started a video clip service to compete with YouTube.
- ITV in the U.K. has signed a deal for distribution over a mobile network. The deal will enable the 3.5m customers on the mobile network 3 to watch ITV1 and ITV Play – ITV's participation channel – live on their mobile phone.
- German TV broadcaster ProSieben has acquired MyVideo, Germany's Youtube.

Device manufacturers – New and stronger role?

While device manufacturers are at the moment being less critically affected than services providers by the changes taking place, eventually there will be a marked impact on their current value chain. Device manufacturers are involved in a three-sided game of influence and negotiating power between themselves, services and content providers, and customers. Customers would like to be able to use the devices and the content they acquire as flexibly as possible

- Locked (mobile operators restrict use of a cellphone only to their network) versus unlocked (customer can use the mobile handset on any compatible network) GSM cellphones.
- The ability to transfer and play downloaded music on multiple devices not just the one on which the original download was stored.

In contrast service providers would prefer to be able to influence and therefore sometimes limit the freedom of consumers so as to enhance the revenues they can obtain, one means being through device-based restrictions or device-related switching costs. Somewhere in the middle, the device manufacturers themselves would like to maximise the size of the markets they can profitably address, which may require achieving a balance between the use of services providers as an important distribution channel, including offering services themselves like Apple's iTunes, and ensuring coverage of other direct and indirect distribution channels whose interests are not tied to specific services or services providers. In achieving or readjusting this balance, device manufacturers will have to take account of the net effect of the forces and trends discussed above, which are facilitating greater freedom and choice for consumers, albeit at different rates and to different degrees in various product market segments.

Innovative companies & services

maxdome

Maxdome is the online pay-per-view portal of ProSieben/Sat1 in Germany. Customers can watch television series or movies on demand or subscribe to certain packages.

➤ www.maxdome.de

Blogger



SonyEricsson's K800i smartphone is preconfigured for the use of Google's blogger, so users can easily share their pictures and thoughts from their mobile phones.

➤ www.blogger.com

Mobile/Portable devices

Today, most mobile devices are sold through mobile operators, who subsidise the devices and have an influence on consumers' choices by promoting them. But faced with the threat of becoming pure bitpipe providers, mobile operators are likely to cease the subsidisation of handsets. As a consequence, handset manufacturers will have to strengthen their direct customer relationships to improve their competitive situations. Some manufacturers have already started to move into Web services and offer their customers additional features and services throughout the lifecycle of their devices.

- Nokia snaps up Loudeye. Nokia, the world's leading mobile handset vendor has announced a €49m deal to acquire mobile music platform Loudeye.
- SonyEricsson plans to launch a new online music service, a move that is comparable with Nokia's purchase of Loudeye.
- Sony and Skype are teaming up to deliver a new next generation portable personal communications device the "mylo personal communicator" which will allow users to connect to mobile and wired phone lines at very low cost from any WiFi access point to which the user has access.
- Samsung will launch a music service when the company begins to sell its new MP3-player YP-K5 later this year.

In addition, we expect that new and improved mobile broadband wireless technologies will increasingly become embedded in a growing variety of portable/mobile devices. This development, which is analogous to the spread of nomadic (but non-mobile) Wi-Fi connectivity within PCs, can already be observed in selected laptops with embedded HSDPA or EV-DO from PC vendors such as Lenovo and Dell, and will be extended to a range of other consumer devices such as digital cameras, iPods etc. It will be interesting to see if services providers have any success (or indeed any interest given the costs involved) in extending mobile phone subsidisation models to other devices, such as offering laptops with embedded mobile broadband wireless at a discount provided a service contract is signed.

Innovative companies & services

NOKIA
Connecting People

smart2go™

Nokia announced the N95, a mobile phone with integrated GPS technology and preinstalled gate 5 software for the first quarter of 2007

➤ www.nokia.com, www.gate5.de

SoonR Beta

Mobile communication and Web service, allows users to communicate with mobile phones using skype and to remotely access a home pc.

➤ www.soonr.com

Fixed devices

Fixed devices from TV sets to set top boxes and desktop PCs exhibit both similarities and differences to mobile devices. In a way that is analogous to mobile operators, cable MSOs exercise influence or even control over the services available to their customers via a user device, in this case a set top box. In theory it would be possible to include set top box functionality within a TV set, and a few steps in this direction have been made, such as the CableCard initiative in the U.S. More widely the question of how integrated a fixed user device should be is one which naturally concerns both the manufacturers of these devices and the service providers for whom the devices are service delivery platforms. An argument in favor of integration of multifunctionality (e.g. a combination of a set-top box, digital video recorder (this dual device is finding increasing favour in the U.S.) plus a TV set and even a PC) is that it offers potential economic advantages due to the sharing of certain components from power supplies to tuners. But against these advantages must be set the fact that different applications and technologies evolve at different rates and with different timings of major changes (e.g. the switch from analogue to digital TV broadcasting versus the switch from videotape to DVD), and the economic lifecycle of different separate devices varies widely (e.g. the average age of a TV set versus that of a PC). Hence there are major economic and practical reasons why integration and multi-functionality of devices will remain limited, although the boundaries between the capabilities of physically distinct “boxes” will change.

At the same time the influence of consumers’ push towards flexibility of use of devices and content will encourage manufacturers to meet the challenge of enabling various devices to communicate with each other, by means that may vary from swapping compatible removable storage devices to in-room, in-building, and long distance communications. Meeting this challenge will generate growing service-related opportunities as well, for example to help consumers make their diverse devices work together seamlessly and easily in the context of the “digital home.” Device manufacturers can exploit these services opportunities themselves, as can network operators and other retail and services organisations.

Web service players – Money, money, money?

Web service players would seem to be poised to become the ultimate winners of the further development of the Web itself. But they too have to master a number of challenges to ensure their future success. Ultimately, Web players need to attract a huge number of customers in order to be attractive to advertisers. But Web players do not yet generally have a direct customer relationship. Although they know roughly who is using their services and when, only rarely do the

Innovative companies & services



Platform allowing users to communicate, collaborate and share documents. Groups also offers mobile features, such as IM and allocation of user rights.

➔ www.grou.ps



openbc.com/xing.com is a (business) networking community which has successfully implemented a business model based on premium subscriptions.

➔ www.openbc.com/www.xing.com

Web companies have a billing relationship with their users which lets them know more than a password and an email-address.

IP players' strategy is to expand usage so as to achieve a greater reach and build richer profiling capabilities, thereby increasing their attractiveness to advertisers. In order to reduce dependence on limited advertising revenue, IPs will also try to leverage or develop paid service and transactional models. Hence they are motivated to try to move into fixed and mobile communications.

As IP-players base their business models primarily on advertising they can offer free services to their customers and thus increase their reach. At the same time, however, they destroy value for telcos. However, advertisement-based business models are limited in growth, so IP-players will eventually have to try adding paid services and other sources of revenue to their business. IP business models may in the longer run depend on combinations of ad-, subscription- and transaction-related revenues.

There are several examples where Web players are increasingly trying to move towards paid services to further monetise the services and applications they offer.

- ➔ Microsoft wants to take a share of the lucrative MP3-player market by launching a player of its own.
- ➔ AOL started a video downloading shop.
- ➔ Google is moving towards content aggregation by teaming up with Viacom and selling videos online.
- ➔ Myspace opened up for music business, by letting non-signed music bands sell their music to MySpace-users.
- ➔ Some Web service players, such as Google, are also taking their first steps into the access business. Google is offering a freely accessible wi-fi network in its hometown of Mountain View. Radios on lampposts throughout the city are now broadcasting an 802.11b/g signal that is publicly accessible by any residents, businesses and visitors within the area of coverage.

Web players are also beginning to move onto the playing fields of mobile operators with convergent offerings. Recent movements by IP players demonstrate their ambition to move into access and content markets as well. To the extent that they succeed, fixed and mobile operators will be increasingly pushed into roles as bit pipes.

Innovative companies & services



CBS and YouTube have announced a partnership that will make CBS content available on the videosharing site. Advertisement revenues will be shared; CBS will have the possibility to monitor the use of copyright material.

➔ www.cbs.com, www.youtube.com

Microsoft has decided to enter the portable mp3 player market by launching the Zune player (announced for November 2006). The player will feature 30Gb of disk space, a wireless Internet connection and advanced peer to peer sharing features.

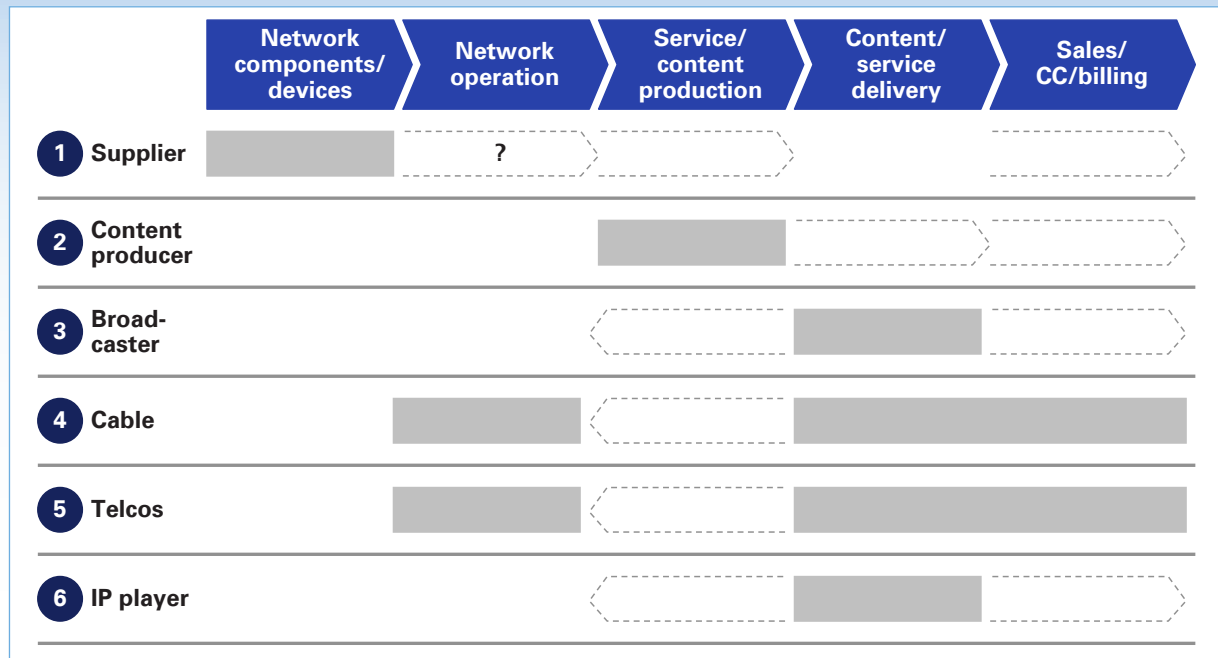


➔ www.microsoft.com

Well, thanks for the info; But what are we going to do now?

As a result of the different converging movements of various players in the TIME-markets, some elements of traditional and historically distinct value chains will converge and new, converged value chains will emerge.

Selected moves of TIME market players



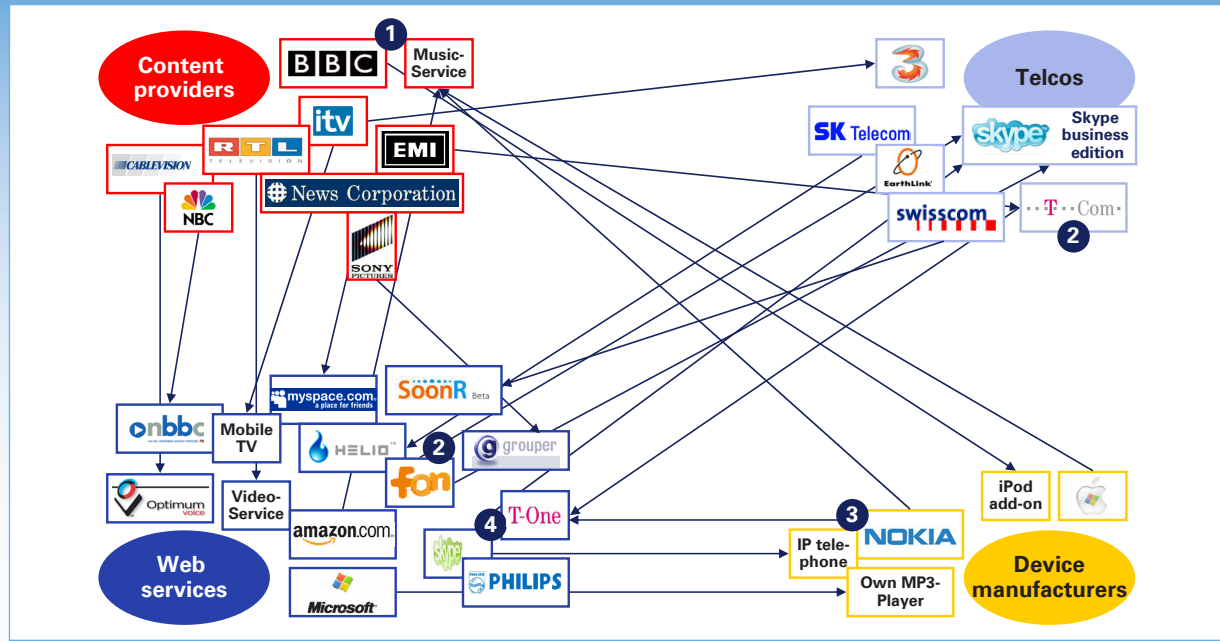
Source: Arthur D. Little

The major thrusts point towards convergence of the different value chains on the service levels. As a result of Web services-driven convergence, competition between the different players in the TIME markets will intensify, as companies move into the historic core businesses or territories of other, formerly non-overlapping categories of players. The following chart illustrates (non-exhaustively) examples of how some of the participants are already expanding into the neighbouring value chains through partnerships and/or acquisitions, or by launching their own services.

Strategic directions of player

- 1** → Reduction of dependency on Telcos
- 2** → Direct customer access margin improvement
- 3** → Reduction of dependency on producers counter-movement against threat by IP-Players
- 4** → Countermovement into Web services participation in ad business
- 5** → Countermovement into Web services participation in ad business
- 6** → Increase reach more towards paid services

Selected moves of TIME market players



Source: Arthur D. Little

The examples shown include links between (a) telephone companies or cable MSOs and Web companies; as well as (b) between device suppliers and content owners (Sony of course owns both), (c) content owners and Web companies; and even (d) a tripartite combination between content owners, web players and telcos/cable MSOs.

Exemplary moves

1 Content/Manufacturing

The BBC announced plans in August 2006 to build a plug-in gadget that will turn mp3 players into digital radios.

2 Communication

T-Com has launched T-One, a phone which can be used over a Wifi-connection at home and through the GSM networks while on the move.

3 Supplier

Nokia offers Nokia lifeblog; the software is made for mobile phones and allows users to automatically organise digital media between mobile phones and PCs and create blogs.

4 Web

In September, 2006 Skype announced the launch of a beta version of its phone and instant messaging software with support for enterprise or business management functions, which will allow a better integration into companies' IT infrastructure.

Summary of challenges and opportunities for the TIME market participants

	Challenges/Threats	Opportunities	Actions (illustrative)	Areas to Contribute Value
Telcos	Limitation to Bitpipe; further decreases in prices/margins of communications services	Exploit location information (especially relevant for mobile operators); use influence with device suppliers when integrating Web services; seamless integration of services across different access methods	Partner with content owners and Web players in offerings to existing customers – major challenges are (a) to devise cost and revenue sharing arrangements acceptable to all parties; and (b) to contribute IMS-type capabilities to the larger, multiparty value chain	Carry traffic; perform session control; charge and bill; offer components such as location and presence information, policy enforcement, authentication, group lists, centralised address books etc.
Cable operators	Limitation to Bitpipe; decrease in importance as distributor of entertainment programming	Integration of Web services; expansion of communications services offerings; seamless integration of services across different access methods	Partner with/acquire mobile operators; acquire or secure rights to distribution of compelling and/or unique content	Similar to Telcos, with relatively greater emphasis on entertainment programming content and consumer versus business markets
Content producers	Growing role of user-generated content; management of multiple content distribution channels	Direct sales to customers; co-branded content (e.g. video games based on movie characters); combinations of owned- and user-generated content	Adapt content for viewing on wider range of user devices; exploit content in multiple formats	Compelling content; unique content/data bases; brand
Web service players	Limitations of ad-based business models; fickleness of users (rapid rise and fall of popularity of Web sites); new search paradigms	Addition of transaction-related and paid services revenues; continued penetration of advertising markets	Extend reach over multiple access channels (acquire networks &/or partner with network operators); partner with content owners	Search capabilities; simple (mass market) user interfaces; content aggregation capabilities; global reach and brand

Source: Arthur D. Little

Conclusion

The disruptive effects of convergence have only just begun to be felt. But the message should be clear. In order not to be left out of the game, TIME market players need to start taking initiatives now, for purposes which, depending on individual circumstances, may range from gaining necessary experience and competencies to aggressively countering imminent threats to existing revenue streams. There is no one-size-fits-all strategy for meeting the challenges described in this report, even among players with similar starting points, let alone across the very diverse mix of companies and traditional market cultures involved in the vast and heterogeneous TIME sector.

For all concerned it is of the utmost importance to assess the strengths, weaknesses, motivations, and personalities of various Web players to understand how to compete and partner them in the context of the changing market dynamics which the Web is creating. In the Web world, most services are established through a continuous process of trial and error. Services are launched in beta, and developed with the help of user feedback. Fortunately launching a Web service does not necessarily require huge investments. TIME players should launch services with partner companies that can enhance their service portfolio and/ or buy and then nurture a couple of Web companies to develop their internal understanding of and commitment to these market dynamics. Even if the unfolding of these dynamics cannot be predicted with certainty, they are bound to exert a profound influence upon the future performance of every company in the TIME sector. Firstly understanding and then harnessing these dynamics will be critical factors of success for companies over the next 5 to ten years, wherever their origins may lie, from infrastructure to devices to applications and content.

About Arthur D. Little

Arthur D. Little's Telecommunications, IT, Media & Electronics (TIME) Practice is a global network of world-class professionals. Together we offer an unparalleled combination of industry experience, understanding of the underlying technologies shaping the global digital industries and mastery of the business processes within these industries. Our work for companies across the value chain in TIME has two main thrusts:

- ➔ We help our clients “lead the pack” – and ultimately increase their value – by revolutionising their strategies and differentiating their products and services globally.
- ➔ We also help our clients enhance their performance and grow their profits by propagating best practices throughout their organisations.

We guide our TIME clients towards a deeper understanding of the strategic, operational and cultural determinants of technology, innovation and financial management, as well as transferring the skills to manage these determinants for the optimal benefit of all their stakeholders.

About Arthur D. Little

Arthur D. Little is the world's first management consulting firm, founded in 1886 in Cambridge, Massachusetts, USA. We are leading-edge innovators, combining industry knowledge, functional experience and technology skills to help our clients grow and create extraordinary value. We have spent 120 years renewing and reinventing ourselves continuously – we come to our clients with a fund of fresh knowledge and experience in leading industries around the globe. Arthur D. Little people bring curiosity, creativity, integrity and analytical rigor to every job, which means fast and dramatic performance improvements. Together with our partners Altran Technologies and Cambridge Consultants Ltd we have 16.000 professionals at your disposal in more than 30 offices world-wide.

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