

INNOVATION REPORT

The newspaper on the digital road

The DigiNews perspective

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The DigiNews project specified, designed and demonstrated a global publisher-to-reader solution for digital newspapers. After an introduction presenting the high business potential of the digital newspaper, this innovation report discusses briefly the project approach and main results, summarises some technical conclusions in the domain of security, personalisation and user interface and, finally, focuses on a possible roadmap for digital newspaper introduction.

Introduction

All aspects of our daily lives are progressively becoming digital: telephony, music, films and photography.... The search for new consumer products needed to sustain our western economies may start from a question about what will be the next such product to enter the digital world.

An answer to this question should also take into account:

- The disruptive technologies which are ready to enter the market and the new digital products which could benefit from these technologies or which could be enabled by them;
- The business value of the new digital product. This value is of course associated with the investment needed to launch the product as well as with the existence of business models required to sustain the product; and
- The various stakeholders, what they want and their impact on the success of the product.

Looking back to the success of the digital camera may help to define several important success criteria for new digital products. Some key phrases include: 'For everybody', 'Same usage model as its today's equivalent', 'Not a new computer product', 'Friendly user interface', 'Additional features to attract early adopters' and 'Cost advantage'.

Taking all these statements into account, we concluded that the digital newspaper was an excellent candidate for next digital consumer product for the following reasons:

- The current newspaper use model – distributed, read and thrown away daily – may easily be reproduced by its electronic equivalent;
- The digital newspaper offers many new service opportunities that may attract early adopters – such as up-to-the-minute stock-market information and breaking news, worldwide access, personalised information, selectable font size, and speaking newspaper for use in the car;
- All the technologies needed to build an attractive product will be available in the short term – the only technology missing until now was flexible displays;
- The digital newspaper infrastructure could be built on current communications infrastructure, avoiding high deployment costs and enabling fast product deployment;
- Embryonic solutions already exist – such as PDF distribution – showing market interest; and
- The low cost of electronic distribution in comparison with the physical transport of the classical newspaper is an indication that the electronic version should be cheaper in the long term or for intensive use. This should thus benefit and motivate users.



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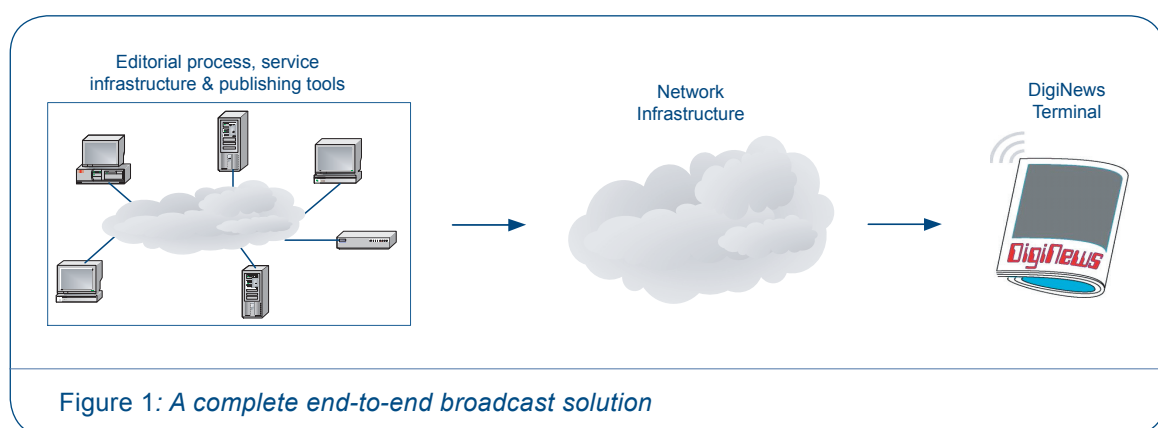
Project approach

The project approach has been defined to take previous considerations into account and thus to enable the definition of a successful product range. In fact, two complementary approaches were followed:

- The theoretical top-down approach resulted in the definition of an extensive list of requirements and an abstract and technology-independent architectural framework that took into account the following three points-of-view:
 1. The *user point-of-view* – use scenarios putting in place the readers, the publishers or the advertiser were instrumental in the elaboration of the requirements of the newspaper system. User tests were also extensively employed to evaluate user interfaces;
 2. The *business point-of-view* – the solution proposed is flexible and enables the implementation of the various identified business models; and
 3. The *technology point-of-view* – pragmatism is the keyword here. In order to limit the initial investment, the digital newspaper is built on the current distribution infrastructure for digital information and on current trends in data presentation.
- The practical bottom-up approach started from the contribution of the various partners and led to the realisation of demonstrators that fit within the architectural framework.

Some technical results

A digital newspaper is prepared with sophisticated electronic publishing tools in a time-critical environment. It is distributed to the subscriber via a broadcasting medium such as radio or television, over the Internet or using future 3G mobile networks. Its use is designed to be very simple and it is capable of being read on thin low-power lightweight wireless electronic terminals.



The solution we proposed is thus basically composed of the following elements:

- A publishing infrastructure;
- A newspaper format based on XML;
- A transport solution for different network infra-structures such as Internet and broadcast radio/television channels; and
- A digital terminal able to receive the information and display it to the user.

Devising a complete solution thus implies the adaptation of relevant technologies to the reality of the digital newspaper. Consequently, the DigiNews project did not focus on a single technology but on



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many of them. Moreover – and in order to have a complete solution – security, personalisation and the user interface were considered. The following three sections stress their relative importance and discuss solutions for them all.

Security

Conditional access refers to security techniques preventing unauthorised users accessing protected information. For the digital newspaper, two cases were considered: broadcast distribution using a radio or television channel, and Internet distribution.

Compared with films, a digital newspaper has a very volatile value; it has no value at the end of the day other than for archiving purpose, while a film keeps a commercial value for some years. Moreover, the size of a newspaper is three orders of magnitude lower than that of one film, resulting in providing less information to the potential pirate. Consequently, the security model for the newspaper distribution via broadcast may be a simplified version of that used for digital television.

For the broadcast case, the following steps were identified:

- *At subscription*
 - Terminal gets a private key – burnt into the terminal, via smartcard/SIM or via an out-of-band channel....
- *During operation*
 - Terminal receives the distribution key – encrypted using the public key corresponding to its private key – via broadcast from the content provider or trusted third party and decrypts it using its private key;
 - Terminal receives content and decrypts it using the distribution key; and
 - Terminal displays the information.
- *For revocation (cancellation of subscription), two cases were considered*
 1. Monthly subscription case: a new distribution key is no longer sent to the terminal, preventing it from decoding the newspaper anymore.
 2. Pre-paid credit: the newspaper will no longer be decrypted once the credit reaches zero.

There is also a need for a tamper-resistant device to avoid the possibility of extracting the distribution key present in the terminal and the requirement to store the newspaper in the device after it has been encrypted.

For the Internet case, the steps to receive the newspaper are similar to the broadcast case except that the terminal may also rely on a point-to-point connection to an authentication server to receive its private key. Instead of being carried out at application level, encryption may be performed at network level and thus rely on IP security mechanisms. However, this solution is less robust.

Personalisation

Personalisation refers to the process of providing the reader with content that specifically meets his profile, preferences or needs.

Personalisation presents an important added value for the two types of customers of a digital newspaper distribution system in the sense that it contributes to their own satisfaction of the service provided: for the reader, it means adequate information at the right time and in the correct context; for the advertiser, it means an adequate message to the right people.



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Personalisation means storage of the user profile as well as information filtering and processing according to this user profile. It may also mean tracking user habits to assess his profile. This storage/processing may be performed at the client side or at the server side. Both types of implementation have advantages and disadvantages:

- A *client-side personalisation* easily resolves the problem of privacy; the personalisation engine accepts all incoming data; analyses it and prepares the presentation of the data according to the user profile. As the personalisation information remains within the terminal, privacy is guaranteed. This type of implementation is particularly appropriate for the broadcast case that delivers undifferentiated information to all terminals.
- A *server-side personalisation* implies the storage of personalisation information in an Internet server. Privacy is thus difficult to guarantee but a user can login to the system from different terminals and still get personalised information.

User interface

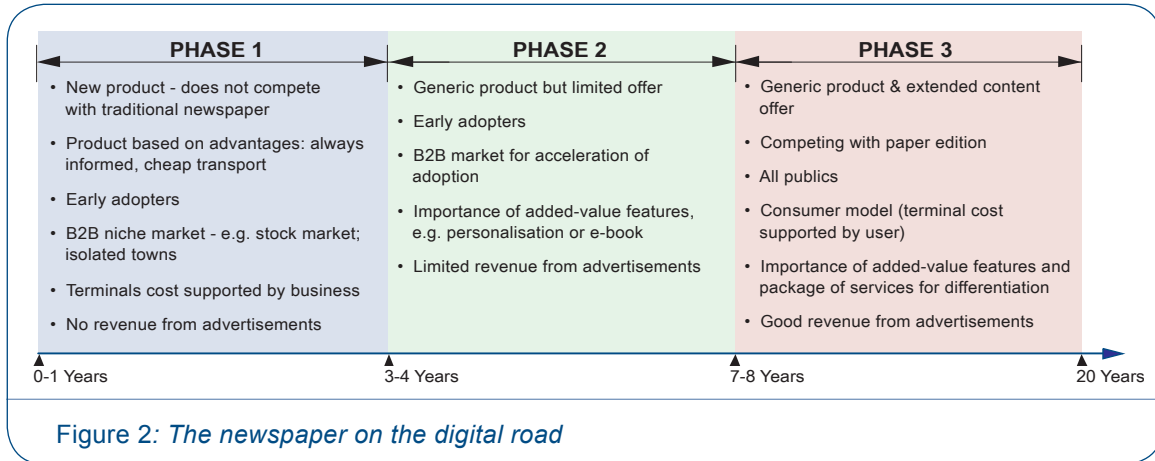
Getting the digital newspaper terminal accepted by everybody is one of the main challenges associated with the definition of an appropriate digital newspaper solution for two reasons:

- Firstly, the electronic newspaper terminal is small in comparison with the traditional newspaper. The challenge is to make this new format acceptable to the reader by providing a user experience that is as similar as possible to the one provided by a traditional newspaper. This could only be done through a careful investigation of the reading process, by its translation in the context of the user terminal in the form of an appropriate user interface mimicking as much as possible use modes of traditional newspapers and by extensive user tests.
- Secondly, computer-literate people are able to use a computer or a PDA, while many other people are reluctant to get involved with technology. Making the digital newspaper accessible by everybody is thus a significant challenge. Having a dedicated user terminal – based on a flexible paper-like display – partly simplifies the problem. Nevertheless, ease-of-use, auto configuration, personalisation and the user interface play important roles in the definition of an adequate solution.

More than 1,000 readers participated in the various user-interface studies. Many user-interface concepts that should lead to a good acceptance of the digital newspaper have been developed and validated. Main conclusions were that:

- The majority of readers (84%) preferred the A4 format. The two preferred layouts are landscape with menus on both sides of the display or portrait with a menu on the left;
- The reading process must remain simple. Navigational aids should include hyperlinks directly to articles on all levels in the information structure;
- Touch-screen and thumb (or pen) navigation with clickable items such as headlines, icons or thumbnails are perceived as natural;
- Pop-ups and blinking messages should be avoided. These are perceived as aggressive and in contradiction with the calm, stress-free environment the reader wants;
- Page numbers or a timeline to get an indication of reading progress and how much is still left to read. This was clearly an aspect that most felt was lacking in today's online newspapers, which were seen as an endless medium;
- Users prefer the same sections of content to be used in the e-newspaper as in the traditional newspaper; too much information in too few sections is not wanted;
- Personalisation features based on the uniqueness of the reader – what is interesting for one person may be completely useless for another – should also take into account the activity context as the interest of the reader may vary if he is at home or at his office as well as the technological context: reading device capabilities, channel bandwidth...;
- Readers also want save and print buttons as well as text-size and personalisation settings.

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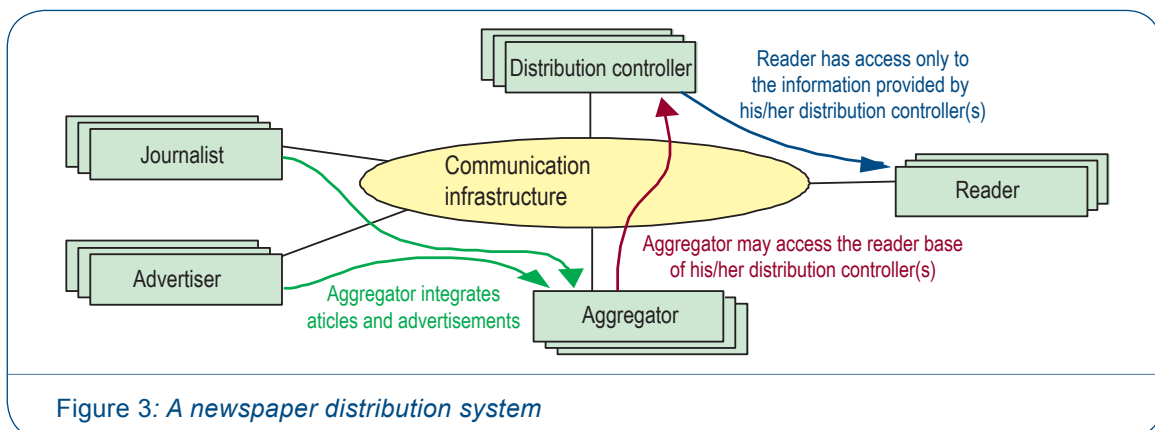


Business considerations

A proposal has been made for the introduction of the newspaper in three phases – see Figure 2 – taking into account the following important issues:

- A traditional newspaper is bought with its paper support. A digital newspaper needs an electronic support. A key question is who will take charge of the cost of the user terminal. In the first phase, a business actor – content provider, the infrastructure provider... – will support its cost and will incorporate it into the price of a service subscription; later, when the service offer will be broad, the end-user will support the terminal cost;
- Value is in the service and not in the hardware; some manufacturers may be interested in contributing to the service package – and getting remunerated for it;
- Advertisers are not interested in the early adopters' market; it is too small to be profitable. At product introduction, no revenue can be expected from advertising – initial targets will be niche markets alert to the added value of a digital edition and distribution.

FA distribution solution for the introduction of the digital newspaper is illustrated in Figure 3.



Conclusion

The DigiNews project proposed and demonstrated technical solutions for the deployment of the digital newspaper, taking into account the expectations of users and business.