Transforming visionary products into realities: Constituency-building and observacting in NewsPad

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Transforming visionary products into realities: constituency-building and *observacting* in NewsPad

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Abstract

In September 1996, NewsPad—one of the first serious prototypes ever of the portable tablet computer went on show during Edinburgh's iTV96 Conference. The paper recounts and analyses the NewsPad experience and, simultaneously, tells a story of the explicit implementation of the *sociotechnical constituencies* theoretical approach to guide and inform the innovation process in highly uncertain conditions. The discussion is structured in short sections from the visions and realities of the portable tablet computer to the successful demonstration of the working NewsPad in Edinburgh. © 1999 Elsevier Science Ltd. All rights reserved.

In September 1996, NewsPad—one of the first serious prototypes ever of the digital tablet (a portable multimedia receiver and player for the consumer market) went on show in the Exhibition Hall of iTV96, the three-day international conference on interactive television organized by The University of Edinburgh. Fig. 1 shows a picture of NewsPad. For three days visitors were able to interact with a brace of NewsPad devices at the touch of the finger, prompting video clips and other multimedia demos, particularly news prepared by the largest Barcelona newspaper *El Periódico de Catalunya* (Spain). It was a glimpse into the shape of personal information appliances and services to come. This was followed by a press release and widespread press coverage in more than 100 newspapers and professional magazines. At

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the centre of the attention was the NewsPad prototype device resulting from ESPRIT/OMI Project 9252.[1]

The concept of NewsPad took shape gradually during 1991 and 1992, and the NewsPad project finally started in March 1994. Briefly, the NewsPad device is envisaged as a portable multimedia receiver and player for the consumer market, displaying broadcast information which includes news, entertainment, education, advertising, and in general any kind of data displayable on the device. NewsPad will allow users to choose and navigate at their will through the contents on offer. Depending on the available means of communication, NewsPad will also allow the 'reader' to interact with the providers of information. In the long term, the information will be distributed via high bandwidth digital broadcasting, and delivered through a low cost, small size, low weight portable "multimedia set" or receiver. This receiver will itself be able to communicate with the information supplier through narrowband digital channels for control and specific services. Inside the European programme OMI, the NewsPad project had the explicit aim of laying the foundations to pull ARM microprocessors technology[2] into the emerging consumer markets of the future.

The NewsPad name and concept were anticipated about 3 decades ago by Arthur C. Clarke in his novel *2001: A Space Odyssey* written in parallel with the screenplay of the film, during 1964–1968 [1][3]:

> There was plenty to occupy his time, even if he [Dr Heywood Floyd] did nothing but sit and read. When he tired of official reports and memoranda and minutes he would plug his foolscap-sized newspad into the ship's information circuit and scan the latest reports from Earth. One by one he would conjure up the world's major electronic papers;
>
> Floyd sometimes wondered if the Newspad, and the fantastic technology behind it, was the last word in man's quest for perfect communications. Here he was, far out in space, speeding away from Earth at thousands of miles an hour, yet in a few milliseconds he could see the headlines of any newspaper he pleased [2].

During the early '90s Roger Fidler described his particular version of Clarke's vision

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[1] OMI stands for Open Microprocessor systems Initiative. It was a major focused cluster programme under the European information technology programme ESPRIT.

[2] The ARM microprocessor was first announced by the UK company Acorn in 1985 and, unlike most microprocessors focusing on improving speed performance at the time, the ARM was part of a philosophy that tried to optimize the overall price/performance of the computer system rather than the performance of the microprocessor alone. This meant the arrival of a small, simple, low-cost, low-power consumption ARM1 microprocessor in 1985. This was followed by the ARM2 in 1987 and the ARM3 in 1989 and, by 1990, Acorn was able to have ARM microprocessors delivering 4 to 8 MIPS [millions instructions per second] at a cost of $12. From this base the *ARM architecture* has evolved to span from very low power systems (< 100 mW) to the high performance low-cost StrongARM family offering over 250 MIPS performance, yet still consuming < 1 W. Today the ARM family is effectively sold as providing leading edge advantages in low-power consumption, cost-effectiveness, short design time, ease of design and ease of integration.

[3] The book *2001 A Space Odyssey* was first published in 1968, the section *Back to 2001* is dated 1989.
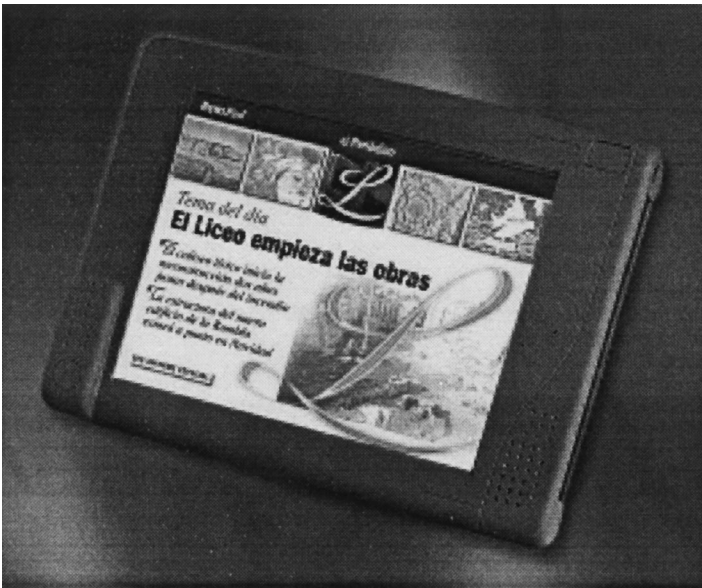
Fig. 1. NewsPad interactive Tablet.

in *Mediamorphosis* and *The Tablet* (see Fig. 2).[4] In Fidler's view, affordable portable flat panels capable of delivering full multimedia content could, by the year 2005, overtake PCs as a method for obtaining information in the US [3]. By that time, he reckoned:

> he will be able to plug it into a hotel telephone socket overnight and take delivery of the full electronic text of his daily reading—the *Miami Herald*, the *New York Times*, and the *Wall Street Journal* .... Customers will be able to click on an electronic pen and pull up a story they are interested in. They will be able to display this at whatever size they want, and if they are interested in soccer game they will be able to click on a sports picture and get a two-minute video of high-lights [4].

This is undoubtedly the ultimate vision of the multimedia information services which will characterize the information society in the next century. Several years later others have also taken hold of the basic concept, and today, it is the common vision behind the different product concepts associated with, for instance, Bill Gates' Wallet PC, Sun's Starfire, Sculley's Knowledge Navigator and so on. This is the path OMI NewsPad Project 9252 began to trail, back in 1994. The danger was that the project would get lost in a vision too far in the future. The challenge was to bring the

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[4] I thank Roger Fidler for this figure.

Fig. 2.   Roger Fidler's Tablet concept [7].

vision closer to reality by producing results which would truly and usefully lay the foundations for new closer-to-market steps.

1. NewsPad—Blazing the trail of the Tablet

Briefly described, the NewsPad portable information appliance (Fig. 1) is powered by an integrated ARM microprocessor, the same chip at the heart of the ill-fated Apple's Newton PDA (personal digital assistant) and other high performance hand-held computing devices such as the much-praised Psion Series 5. NewsPad consists of a rugged plastic enclosure around the size of an A4 sheet of paper, which houses a large, high-resolution colour active matrix LCD screen. The user interacts with 'newspaper' contents, selects and navigates information paths and generally controls the system all through a finger touch screen overlay. NewsPad was designed for maximum simplicity and there are no other user control buttons than an on/off switch. NewsPad display capabilities are rich in multimedia, including motion video and full 16-bit CD-quality audio, colour still images, infographics and animated information sequences, in addition to more traditional newspaper graphics and text.[5] The News-

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[5] This is rendered using sophisticated font outlining and anti-aliasing techniques for vastly superior visibility than normally found with simple bit-mapped graphic text.

Pad unit also includes a small audio speaker and has provision for the inclusion of an integral microphone and compact colour video camera. In the future, the camera could enable users confronted with newsworthy situations to become 'instant reporters.'

Developed by UK's Acorn Computer Group and *El Periódico*, the NewsPad system has already entered the select list of European ESPRIT 101 successes. Perhaps, the most enthusiastic reason for this perception of success has been given by Sun Microsystem's Bob Glass, who worked on the human interface issues for Apple's System 7 and PowerBook and was responsible for the space walk system of the Lockheed space station programme.

> When I walked into that exhibition and saw the platform, I thought: "Eureka—The future at last! NewsPad represents a significant change in the way we interact with and use technology. It represents a breakthrough in saving our environment. Just think—receiving the news complete with multimedia presentations, while saving precious untold earth resources, i.e., trees, printing ink, energy sources and time! I never thought I would see a device like this so soon".[6]

Indeed, one has only to watch the futuristic video film produced by Sun Microsystems under the title 'Starfire' to understand the reason for Glass' excitement [6]. NewsPad offers today, in a real although very incipient and rudimentary form, what the Hollywood-created scenario can show only as a vision for 2004. Of course, NewsPad still has a great deal of trailblazing to do before the system truly joins the ranks of mass market products. The key issue however is that one of the first members of the visionary interactive window into the information society is already here and Europe has been first off the mark.

The future challenge for NewsPad is the same facing many other leading edge European computing technologies. Will Acorn be able to translate the NewsPad technical lead into a real and commercial market presence? Only time will tell—and Europe has a less than enviable record on this part of the track. As Acorn's Tim Caspell commented after NewsPad's public showing:

> NewsPad admirably demonstrates our technology, and our lead in the area of high-performance computing appliances both wired and portable, and the application to the field of newspaper publishing is both novel and captivating, but the eventual commercial success of NewsPad will depend upon a number of other factors, most notably the partnerships with content providers and infrastructure operators. Assuming this co-operation can be developed, the current technology is immature, and development to an eventual successful conclusion will also require the concerted efforts of Acorn and similar companies, most likely with continued support from structures like the EC's OMI programme. We look forward to the continuing

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[6] Personal communication with Bob Glass, 1996.

development of both the ideals and the technology of NewsPad, and to eventually making today's dream into tomorrow's commercial reality.[7]

2. Aim, perspective and approach of the paper

The portable tablet computer is still very much the stuff of visions, uncertainties and risks in the path towards the information society. This is the theme of this paper. It is about visions and how pioneers go about trying to make them happen, building perceptions, events and technology, sometimes against technical and organizational limitations and practices, poor resourcing, and isolation. It is the story of products that most informed observers recognize will be widespread in the future, but nobody knows exactly when and how they will happen, and certainly few are demanding them now because users themselves will be born in the course of the process.

It is simultaneously a story of implementing an explicit theoretical approach (i.e. *sociotechnical constituencies*)[8] to guide and inform the innovation process in highly uncertain conditions. The paper intertwines these lines and is written from an ***observacting*** point of view, i.e. as a researcher and actor trying to make innovation theory and strategic reflection effective instruments for purposeful action. This *observacting* role generated a most enriching interaction **between** the theory brought into the project to inform strategy **and** the practical demands generated by the development of the project on the theory itself. Several conceptual instruments were indeed the result of the project just as much as the hardware and software it generated. The paper attempts to capture this feature and goes full circle. The constituencies approach is used to explain its own further development inside the NewsPad story.

A research risk sometimes noted is that of getting too close and not seeing the wood for the trees. In the NewsPad case there was little risk of this occurring. The trees are just being planted out of the visions, expertise and resources of the players and it is not clear which shape the wood will eventually take. In this context, the most fruitful role innovation *observactors* can play is to understand, inform, respond and, often, develop specific tools that transform general guidelines into practical actions for sustaining the process in uncertain, fast changing, and sometimes crisis conditions.

The data for the paper was collected during innumerable interactions inside News-Pad: meetings, conversations, archival documentation, a huge e-mail record of interactions, participation in conferences and some secondary literature. Critical to the organization and processing of the data was the generation of a series of *Alignment*

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[7] Personal communication with Tim Caspell, Acorn's European Projects Manager and responsible for Acorn's participation in the NewsPad project.

[8] This concept postulates that successful innovations always entail the build up of ensembles of technical constituents (e.g. machines, instruments) and social constituents (e.g. institutions, interest groups) which interact with each other in the course of the creation, production and diffusion of specific technologies such as NewsPad. More specifically, this happens through a constant *process of alignment* of technical and social factors and actors promoted by the social constituents and concerning intra-organizational, inter-organizational, and often industrial standard processes.

Reports and the *Evolving Master Scenario (EMS)* during the life of the project. This provided systematic pictures of the state of development of the constituency at periodical intervals. These instruments will also be discussed below as they are very much part of the story of NewsPad.

In the following, the paper describes major episodes in the story, integrating both relevant information on the constantly changing environment and the contribution of innovation theory just as they have happened, all along the emergence and development of the NewsPad constituency. The paper is structured in short sections from the visions and realities of the portable tablet computer just discussed to the successful demonstration of the working NewsPad prototypes in Edinburgh's iTV96 conference, and beyond to the successful European and worldwide promotion of the prototype.

3. The players and the European proposal

The NewsPad process involved the complementary participation of several European organizations. The coordinator was El Periódico (Spain), who contributed the actual content of the new multimedia newspaper and advertising. CARAT Expert (France) contributed their specialist knowledge in the advertising field. Acorn Computers Ltd (UK) contributed the hardware and system software of the portable, interactive device; and they also supported El Periódico with expertise regarding the production or authoring equipment required to produce the content of a multimedia newspaper. Archimedes Ltd (Greece) produced the specialized software required for the filtering of the broadcast multimedia news and information. Institut Català de Tecnología (ICT) (Spain) examined and tested the most appropriate methods of broadcasting multimedia in the context of a news service. ICT also supported the Technology Management and Policy Programme (TechMaPP) from Edinburgh University (UK) in aspects of the business and innovation process implemented by the project. The methodology for this innovation process was the responsibility of TechMaPP and was geared to generating a systematic strategic approach to innovation in circumstances of major market uncertainty.

From very early on, the NewsPad process explicitly acknowledged that technical factors alone will not determine the success of an emerging technology such as the "multimedia newspaper". For these reason, it treated the entire process as one of creating a multimedia-newspaper "sociotechnical constituency"[9]—in which major constituents are the final "readers" and business organizations able to exploit the technology, such as publishing companies, advertising companies, service providers and others. In addition, it was recognized that the essence of constituency-building is the deeper process of stimulating and promoting alignment among "readers", sup-

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[9] "Sociotechnical constituencies" are defined as dynamic ensembles of technical constituents (e.g. machines, instruments) and social constituents (e.g. institutions, interest groups) which interact and shape each other in the course of the creation, production and diffusion of specific technologies or services such as the "multimedia newspaper". On the concept of "sociotechnical constituencies". [21–23]

pliers and their technologies, and other players important for the emergence, development and shaping of the technology (*sociotechnical alignment* [7]). NewsPad's activities were informed by the explicit aim of realizing this process of alignment, and this was primarily the role of TechMaPP.

Fig. 3 gives an overall idea of the holistic approach taken by the project.

The central focus was the build up of the multimedia newspaper constituency, bringing together at least the range of generic technical constituents shown in the first circle from the centre and the range of social/organizational constituents in the second circle from the centre. Not all areas could be pursued in the same depth, thus the project defined a path consistent with the potentially available resources, developing certain areas while tracking and monitoring developments in others where it would be difficult to make a major or isolated contribution such as the case of IPR issues.
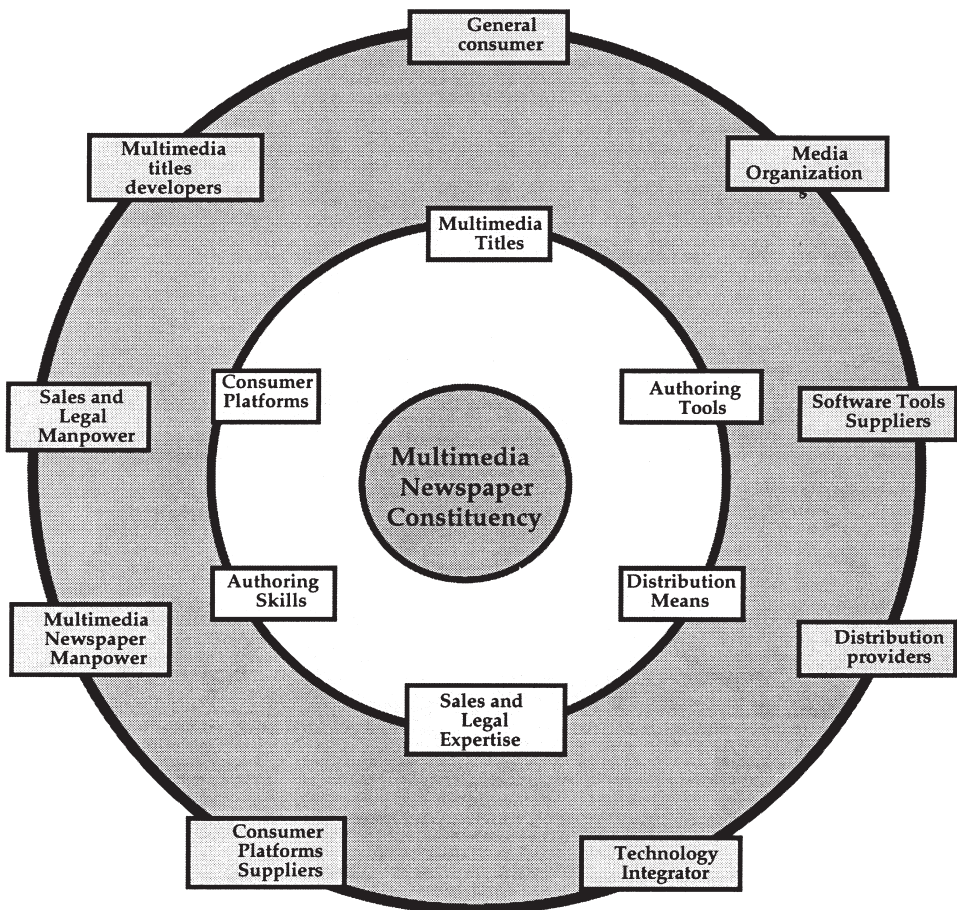

Fig. 3.   Key generic sociotechnical constituents of the multimedia newspaper.

4. The start of the NewsPad project

Following the selection of the proposal to the European R&D programme ESPRIT, project NewsPad begun in early 1994. The first task to be collectively implemented was the creation of scenarios, with each organization taking responsibility for those areas of specific concern to their expertise. These are shown in Table 1. The areas clearly reflected the most important constituency building dimensions identified in Fig. 3. The most distinctive and critical constituents for successful alignment with the European funders were the ARM-based interactive tablet and the multimedia newspaper content. So the first collective discussions tended naturally to concentrate on these two areas in which the lead players were Acorn and El Periódico respectively.

On the multimedia newspaper content, El Periódico (Technical Department) initiated a process of deep reflection about the meaning of multimedia for them. As a publisher, it was their 'natural' role to look at the NewsPad system from the point of view of both producers and users of content. EP's problem was also to anticipate how this new emerging technology of multimedia would affect their present organization and well-established paper-based product. From this angle, the tablet was one type of terminal among others for the delivery of their multimedia information. Of course, for Acorn this was similar in that EP's content was only one type of content for the platform, although the aim was to make it the preferred 'interactive screen' for multimedia information viewing.

EP explained that for them multimedia is a conglomerate of technologies. As information providers, their preoccupation was how to create a new language to generate new levels of 'reading' and communicating vast and increasing amount of information whilst maintaining EP's distinctive personality. Today there are different levels of reading: headings, subheadings, text, photos, infographics, etc. Every journal has its own style and use of language. Political journals differ from sport journals, etc. A number of key issues emerged, such as the balance between information and entertainment in the production and consumption of a 'multimedia newspaper'. There was also a feeling that information and education go very much together in the new medium. EP felt that the success of NewsPad in the long-term requires the emergence of a new language. It is a cultural invention. At the same time, there was little doubt that the newspaper world will eventually change to embrace the new product. A

Table 1
Scenario creation responsibilities

Partner	Task
Acorn	Platform technology (hardware and software)
El Periódico	Newspaper content
ICT	Communications
Archimedes	Authoring tools
ASA films (later replaced by CARAT Expert)	Advertising and multi-language newspaper
Univ. of Edinburgh	Newspaper trend-mapping

comparison between the present and the future newspaper models was developed to highlight the nature of the change.

A simple model of the current newspaper underlined features such as:

- mass market
- cheap
- portable,
- disposable
- non-linear, as-much-and-when-you-want reading
- some interactivity, e.g. through letters to editor
- secondary use as packaging material
- physical limits to amount of information
- limited geographical reach
- sometimes difficult to read (plane)
- 24-hour information cycle
- environmentally unfriendly.

In contrast, the new multimedia newspaper was envisaged as bringing radically new added value through a range of potential performance features such as:

- provision of access to unlimited and last-minute information (same opportunity of reaction than radio and TV)
- personalization of news to fit user's profile and interests
- richer and more attractive presentation of information through variety of media
- distribution potential to sparsely populated areas
- re-usability of information through 'archiving' for later easy-access reading and use
- ability to follow story into past and future through threading capabilities
- non-linear reading with enhanced selectivity and personalization mechanisms
- enhanced interactivity and immediacy of response
- environmental friendliness.

Obviously these were seen as potential features informing a long-term vision or scenario. One has to consider that today's newspapers are extremely competitive. Yet sweeping technological alternatives are on the agenda and, as has happened recurrently in the history of technology, some years ahead they are likely to become cheap and good enough to contest the dominance of the current newspapers.

On the interactive tablet, Acorn explained that, as technology suppliers, *they try to provide what people ask for, although there might be gaps between dreams and realities especially at an emerging stage of a technology such as NewsPad*. For Acorn, the newspaper was a very interesting mass market. At present, it is a craft industry, totally mature, with well refined skills, and well understood fundamental processes. The products of this industry, newspapers, are totally portable, transportable, but sometimes difficult to read (e.g. in a plane). Acorn believed that many years ahead there will be technological alternatives, i.e. technology will become cheap and good enough to replace newspapers—after all newspapers consume a lot of trees and are not very 'green.' For the NewsPad portable tablet, Acorn hoped to

produce a small number of portable machines but warned that cost will not be cheap. Initially, it will try to develop an scenario containing a sort of 'technical shop', i.e. a report with ranges of prices and functionality for ingredients such as battery, storage, etc.

4.1. The birth of FrankensPad

By May 1994, EP had started work on the first "monstruo" (monster), i.e. a very rough first prototype of media mixes and presentational features which could potentially form part of a new product. It was supposed to be 'ugly' in relation to the more developed product, thus the reason for the term 'monster' used in the newspaper world. From the viewpoint of hardware and authoring, the 'monster' was not intended to be a practical concept. It suffered from at least the following limitations:

• Made use of a Mac and had taken a great deal of time to generate. It was totally unfeasible in terms of production.
• Initially, the authoring package Authorware was tried but limitations led to the choice of Micromedia Director as a better option. Authoring tool technology required major advances to be able to work more efficiently.
• Used very high quality VGA screen. This resolution was expensive and it was not available for a portable version.
• Touch-screen concept was not implemented. It used a mouse and icons were small for finger pressing.

The positive aspect of the 'monster' was that it provided a visible 'target', forcing focus and creation around conceptual problems and definition. It set the consortium on an evolutionary path towards discovering the new communication, information and formation (CIF) concepts multimedia makes possible for the newspaper industry. EP was not happy with the anonymity of the 'monster' and Franken's Pad (later FrankensPad) was born, after all NewsPad was trying to put elements from various 'organizational bodies' together.

In July 1994 the consortium met in Barcelona and EP demonstrated FrankensPad. The intention was to explore concepts for a possible multimedia newspaper. FrankensPad was produced with a Mac and took a great deal of time to generate. Its purpose was to stimulate discussion. FrankensPad is 'ugly'-text and sound did not match by design. EP explained that they have used 'dummy' text and sound to avoid the discussion focusing on content. This would help to show the underlying communication concept more clearly in the abstract.

EP explained the difficulties and the way they went about defining the new NewsPad (FrakensPad) multimedia communication concept. They wanted to be innovative and started with a 'creative retreat' because they did not want to be influenced by TV, newspapers, etc. The intention was to create a product which was able to provide news in all situations. Its functionality with respect to news should be at least as good as TV, at least as good as radio, etc. A user should not put NewsPad aside because of inferior functionality. EP tried different starting approaches. They tried a sort of 'novel' approach to envision the concept in context. This was basically a

short-story from the point of view of an imaginary user of NewsPad and it was useful for contextualized scenario building. This 'novel' had parallels in the Media-morphosis scenario used by R. Fidler for his Tablet. EP also worked on a more traditional definition of a news-script in all the steps, building on internal round table discussions involving journalists, creatives and other personnel. All these activities contributed different angles and EP was persuaded that for the *new language* there could not be a one single approach. Eventually, EP's NewsPad constituents decided to go for a concrete prototype: a sort of "*brainstorming, discovering and creating by doing*".[10] They thought that this could be the way to catalyse and raise the target level, forcing focus and creation. In parallel, books were consulted for ideas on key elements of the new language such as icons. In doing the prototype, EP were faced with various conceptual problems, definitions, etc., but they found this approach most valuable. They wanted the product to be appealing for the consumer market. It had to be fun, it could not have poor quality sound or poor quality video. EP stressed that this kind of product was not around the corner and it is perhaps 5 or more years away from a viable commercial product but they feel this was the way they wanted to go. In fact, the technology used for FrankensPad (Authorware) was totally unfeasible in terms of production. FrankensPad took a long time to author and, at the time, there were no other suitable authoring tools in the market. The technology required a big leap to be able to work more efficiently.

This raised questions about the type of feasible pilots during the life of the project. There was agreement in that the pilots would need a prototype demo fast enough to communicate the proper appeal of the product. There was no point in piloting something that NewsPad constituents knew would be a slow boring product and then ask how exciting is it? or how much are the users prepared to pay for it? For the pilot, the project needed to have software tools for rapid interaction and a demo with appropriate response-time to yield valuable results. This meant better than the initial Authorware. TechMaPP warns that *the potential mis-alignment between today's capabilities of the technology and the ability to simulate and communicate the features envisaged for the future product (see model of future newspaper above) was one of the main problems affecting meaningful final user involvement in the design of advanced multimedia products*. Careful management of this problem would be required for effective long-term constituency-building. At this early stage, however, this mis-alignment was not problematic for the search of multimedia newspaper concepts for a longer-term product. EP expected the 'monster' to trigger ideas from the consortium,[11] and eventually advance to an aligned common view. Indeed, a thorough discussion took place during the two-day meeting and a great variety of content areas and features for a multimedia newspaper were identified.

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[10] This would happen in a situation of search for something totally new such as a new 'killer application' or a groundbreaking concept of multimedia newspaper. Here people broadly know what they wish as well as many of the elements they will use to achieve what they wish, but they don't know yet the detailed shape of the integrated product or innovation.

[11] This would be a sort of second ring of brainstorming—which eventually would be supplemented by a third ring with the Round Tables of external experts.

4.2. The computing path of the platform

On the side of the hardware platform, as the project progressed it became clear that the dominant development track will be computing and not the TV. There were two reasons for the lack of attention to TV: Acorn is a computer company and TechMaPP's trend-mapping work on the Evolution of Multimedia in the Newspaper Industry showed that computers were the favourite platform for most newspapers experimenting with multimedia, either through CD-ROM or Internet. At this point, a question mark began to arise as to the future of NewsPad at all.

5. NewsPad's alignment difficulties and responses

By Autumn 1994, the alignment situation of the NewsPad constituency building process was not optimal. Fig. 4 structures the various dimensions and levels of alignment NewsPad was facing in different combinations and intensities at different times.

The state of each one of these dimensions is described below.
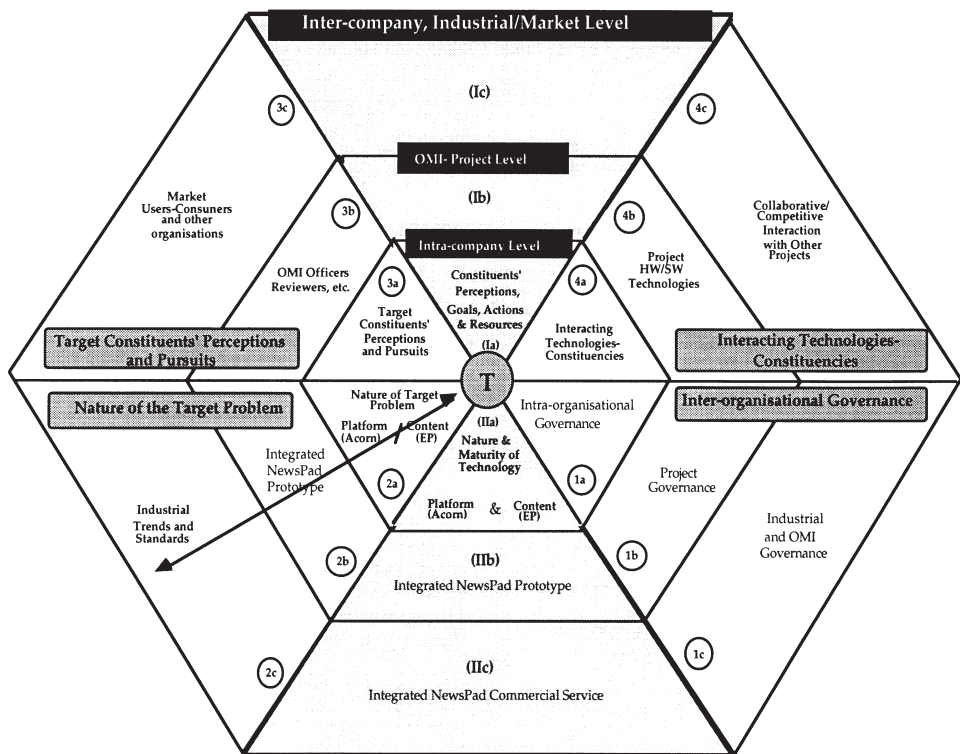

Fig. 4.   Intra- and inter-organizational diamond of Newspad alignment.

(I) Constituents' Perceptions, Goals, Actions and Resources

(Ia) Inside the EP/Acorn axis the perception of constituents was that NewsPad gave the companies a valuable opportunity to explore present multimedia developments and set themselves early into the path of products which might give major gains to the organizations. At the same time, it was a product for the long term and this made it difficult to give it urgency inside the organizations. The goal was to start the path using the opportunity opened by the EC resources.

(Ib) No clear definition of system, better perception of scenario-building process and actions leading to definition of system. The open ended situation created possibilities of mis-alignment in the interpretation of what the partners would do and/or expected from each other.

(Ic) Market for NewsPad service was for beyond 2000. NewsPad had no other constituents at the industrial/market level.

(II) Nature and Maturity of the Technology

(IIa) Acorn had to produce the portable tablet computer prototype out of available technology (key proprietary technology ARM and RiscOS). EP had to produce the multimedia newspaper prototype out of their experience with newspapers but it was clear that new forms of 'language' should be created. In both cases, the state of development of component did not enable the companies to develop products with cost-performance characteristics for a viable commercial product. Platform and content prototype were all the project could aim for at this stage.

(IIb) Integrated platform/content NewsPad prototype will happen out of the specific contributions and dialogue of EP and Acorn. The exact shape was not clear. It will be the result of the scenario-building process.

(IIc) Technology for low-cost, high-performance NewsPad commercial service was for beyond 2000.

(1) Governance

(1a) EP's governance was geared to creating, producing and delivering the traditional newspaper product (see above for characteristics). The Technical Department was the supportive environment sustaining NewsPad. Interaction with other departments was slow and acceptance of NewsPad as mainstream technology required substantial change in attitudes, skills and management relations. Acorn is an innovative technology company whose traditional business had been desktop computers and workstations for the education market. Margins in this business were very low and Acorn was redefining their market targets towards information appliances such as set-top boxes. The desktop computing market was no longer viable for the long term but NewsPad was too long term to become a mainstream solution.

(1b) Consensus was the formal governance of European projects. De facto however the dominant players were EP and Acorn, responsible for the mainstream platform and content to be delivered.

(1c) NewsPad belonged to the broader governance of the OMI focused cluster programme and it had to satisfy the contractual requirements and responsibilities associated with the funding. In particular, NewsPad was the subject of periodical reviews of progress conducted by independent reviewers. Beyond into the market, multimedia broadcast services for portable interactive screen had created no perceivable market governance. Other products such as CD-ROMs and Internet were beginning to reach the market first.

(2) Nature of Target Problem

(2a) The target problem for EP was the generation of multimedia newspaper content and for Acorn was the interactive tablet computer. The detailed specifications were open to be defined during the project, giving NewsPad constituents manoeuvring space to align and re-align the target problem.

(2b) Integrated platform/content NewsPad prototype also open to be defined during the project and should crystallize contributions from EP and Acorn as well as relevant inputs from other partners. Again, NewsPad constituents had manoeuvring space to align and re-align the target problem.

(2c) For the future, the target was the creation of a commercial multimedia news and information commercial system. But this would demand much further development than NewsPad would have at the end of the project. There were no other platforms in the market. This was a commercial world yet to be created.

(3) Target Constituents' Perceptions and Pursuits

(3a) Inside Acorn and EP, NewsPad constituents had plenty of target constituents to try to bring behind the project. These included people from different parts of both organizations including top management and company directors.

(3b) There were no target constituent to bring into the project initially, but in the context of the OMI programme, for NewsPad was important to have OMI officers and reviewers as constituents. This did not mean blind acceptance of the results of the project, perhaps the contrary, asking the most of the project to see it through as a solid success. But it did also mean a great deal of understanding of potential difficulties and their solutions.

(3c) There was no concept of portable multimedia newspaper or multimedia news information systems among market users consumers. NewsPad planned to engage in a dialogue with target users through pilots.

(4) Interacting Technologies Constituencies

(4a) Inside the companies the cash-cow technologies (constituencies) had the dominant presence. At EP, the traditional newspaper dominated completely and it was important that NewsPad was perceived as non-threatening and, indeed, supplementary (non-obligatory complementarity [8]) to the main product. Multimedia CD-ROM and Internet activities were starting at *El Periódico*. At Acorn, the cash-cow of desktop computers was no longer viable in the long term and

although there were opportunities for new technologies, NewsPad was too long-term to take advantage of them. Acorn had launched in July 1994 the company Online Media aimed at Interactive Multimedia through set-top box and the TV screen.

(4b) The Acorn's interactive platform and EP's multimedia content had a clear obligatory complementarity in the NewsPad system, although the platform could (and should) have a wider range of content, and the content could (and should) run in a variety of platforms. NewsPad needed both to be a system. Other technologies were required for the entire system to work (e.g. communications, authoring, user profiling (personalization) software).

(4c) NewsPad intended to search and identify similar experiences with the aim of stimulating the formation of a broader portable multimedia newspaper constituency, sharing experiences and promoting the overall concept. At this stage it was clear that the concept of portable tablet newspaper was perceived as a long-term service, so it made sense to join forces to promote the field rather than just a single product constituency.

From this holistic assessment, it is possible to say that by October 1994, NewsPad was showing weak alignment at the intra-organizational level [a] of the constituency-building process. Indeed, NewsPad was yet to gain acceptance as part of the mainstream strategic technologies of both Acorn and EP. The perception that NewsPad was for the long-term did not help. This affected the advance of the project in the area most important for OMI's governance, the ARM-based portable interactive platform aligning the project with OMI.

At the level of the project itself [b], the driving EP/Acorn (user–supplier) core was not yet able to pull the process, and the technology driven scenario-building was not happening. As a result, the overall convergent process of scenario-building was not happening, rather the different ingredients were progressing separately with possible potential for mis-alignment between these contributions. The governance of the project was also affected as constituents were not being pulled together into a close interaction. This created problems for management.

At the industrial/market level [c], the performance of NewsPad was beginning to fall into mis-alignment with the governance of European projects. This was threatening because the withdrawal of support would lead to the immediate demise of NewsPad given the intra-organizational situation. Regarding Interacting Constituencies [4c], NewsPad's external constituency-building was premature, as uncertainty was affecting the dialogue with other projects opened by NewsPad constituents themselves.

6. Rising up to the challenge

By early 1995, a marked improvement took place as Acorn and EP decided to push forward with NewsPad and this pull provided the entire NewsPad constituency

with the clear momentum it had lacked so far. Thus, the EP/Acorn core advanced in multimedia content and hardware, whereas TechMaPP made an effort to codify (articulate systematically) the *constituency* methodology through the generation of a number of practical instruments for the constituency-building process of NewsPad (e.g. trend-mapping, monitoring of strategic scenario, pilot approaches). These enriched the constituency approach, making it more directly practical to the action of what was after all a true technological innovation process and not just an academic study. Ultimately, *observacting* began to manifest itself through crytallizations of the NewsPad constituency-building process, not unlike the hardware and content crystallizations of this process.

6.1. The specifications and the race towards the platform

Acorn's first NewsPad specification document was completed in early June 1995 and circulated for feedback to the user partner. An understanding of what were the most convenient cost/performance choices was now implicit in this document. Admittedly, this should have been the result of a more explicit scenario-building exercise, but pressure had built up on the consortium making a luxury of a slower more thorough process of market research. The advantage of moving fast to the specifications was that they provide a more systemic, product-like 'technology scenario' for the consortium partners to interact. Indeed, EP welcome the specs and provided a detailed feedback which was, in turn, strongly welcome by the Acorn design team. This led to a second version of the specifications by end August 1995. These specs became the paper-version of NewsPad guiding the construction of the first prototype, which was later expected to lead to a much wider process of user alignment. Fig. 5 shows the proposed shape of NewsPad and Table 2 lists the main criteria pursued in the specs.

Acorn was now thrusting forward to make the specifications into a tangible, demonstrable NewsPad platform. The first prototype was expected to be available by November/December 1995, enabling the start of the pilot-phase of NewsPad. The final machine would be produced towards the end of the project and Acorn would provide a detailed costing of manufacturing a significant number of these machines with a view to exploring the possibility of a large-scale trial of a multimedia newspaper following the expected success of the project.

The perspective of the partnership was beginning to extend from short-term responses to the long-term again. There was renewed confidence in that the NewsPad platform taking shape was making use of advanced components and the full multimedia hardware/content system was expected to be at the leading edge of technical performance. As a prototype however there were still well-known bottlenecks affecting cost/performance for a viable commercial product. But important changes in critical components were envisaged which might remove these barriers in the future. For instance, in the next ten years rechargeable fuel cell batteries may become available which will substantially remove the present difficulties. At the same time, screen technology was evolving into lighter and cheaper products making the production of systems such as NewsPad potentially much more affordable for the mass market.
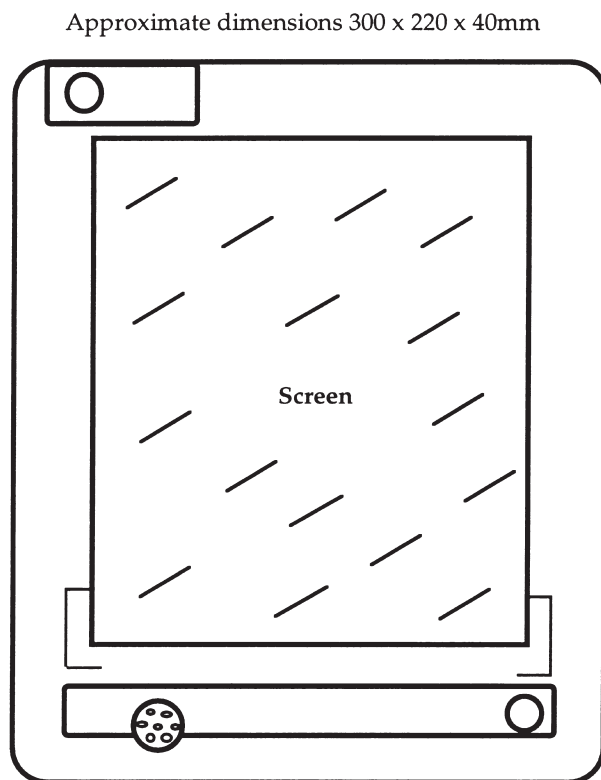
Approximate dimensions 300 x 220 x 40mm

Fig. 5.   First schematic representation of NewsPad portable platform.

6.2. *The refining of FrankensPad*

At El Periódico, the development of the multimedia newspaper also continued to progress. The original 'FrankensPad' version was refined to the point where the term 'monster' was increasingly inappropriate. Indeed, the prototype was rapidly approaching the point when it would be possible to submit it to the judgement of 'readers' in Barcelona. Fig. 6 shows an example of a full NewsPad screen with the 'news carrousel' at the top. Snapshots of the news move along the carrousel and the reader can 'click' into them at the touch of the finger.

This was a major advance in the constituency's evolutionary path towards creating-by-doing (and trying) the new communication, information and formation concepts multimedia makes possible for the newspaper industry. As the prototype came nearer to what could be a well defined prototype, the concept of 'dummy' (completely unconnected) text and sound[12] was also superseded. It was useful for EP's internal

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[12] Initially, this helped to prompt discussion in the direction of an abstract CIF model, rather than in the direction of a specific item of news.

Table 2
Criteria pursued in the definition of NewsPad specifications

● Adequately high performance, memory and storage to deliver multimedia content information quickly, cleanly and smoothly to the 'reader'.
● Acceptably small and portable commensurate with having a relatively large screen display area with high resolution.
● Acceptably light in weight with a target maximum weight of 1 kg (battery included).
● Sufficiently robust within the confines of weight and size. Usable in a variety of environments: hot/cold, wet/dry, and dusty/adverse conditions including out-of-doors use in the rain, on the beach (sea + sand) and on-the-move in trains, automobiles and planes (if allowed).
● Sufficiently autonomous with a target of a full 16-hour working day at 60% average duty cycle or 8 hours of continuous use without recharging battery (in each case with only access to storage devices).
● Fully integrated means of user interaction consisting of a single self-contained portable unit which require no additional item for normal use. User control will be through a touch-sensitive screen, including a 'soft' keyboard which may be provided on screen, and it will be possible to connect to an external PS/2-style keyboard or keypad.
● Industrial standard external connectivity through a standard PCMCIA interface as the only route to general functional expansion (except possibly for external main RAM expansion). The portable unit will also have an external docking station connector for access to other external interfaces.
● Thief deterrence through the incorporation of a hardware/password protection system which will totally prevent unauthorized use, and which can only be factory reset.

Fig. 6.   Picture of refined NewsPad multimedia content.

round tables which provided the first steps in the process of consultation. But now, EP was polishing what would look like a realistic potential market product. Among the features now implemented in NewsPad content were:

- *Conveyor belt or dynamic carrousel* on the first contact interface with the user. The carrousel is made up of frames and, as news change, the carrousel acts like an infinite conveyor belt. The carrousel is in itself a first level of news—something like Euronews.
- *Dynamic icons*, making use of video clips to call attention. For instance, a news-flash on a terrorist attack may be presented through a video clip showing an explosion. This brief video may impose itself on the screen to attract attention.
- *Animated graphics*, following on EP's own style in the traditional newspaper which made use of a great variety of graphics.
- *Text customization*, for instance, large type fonts for short-sighted, etc.
- *Multimedia flash* for quick news, using dynamic icons followed by short text briefing. Flash news also make use of 'future threading' by launching the flash news first and then building it up as it comes.

In addition, *El Periódico Online* and *El Periódico CD-ROM* both had become firm part of EP's evolution into multimedia. For instance, the CD-ROM version was priced at around £70 (subscription) and had attracted some 1300 users. EP's was monitoring the reception of these products and the lessons to benefit NewsPad. One particular aspect under permanent scrutiny was that of possible charging and payment mechanisms for a potential service such as NewsPad. TechMaPP's analysis of the evolution of multimedia in the newspaper industry had identified various options under trial, for instance, in the Internet. On the whole, however, the payment arena remained a major issue with much of the discussion concentrating on security and encryption techniques. The perception was that, as yet, no system guaranteed a secure, immediate and convenient mechanism for processing transactions of products and services in the net. This state of affairs was also valid for news and information services based on wireless communication. Products were beginning to appear, how-ever, which promised to allay much of the security fears affecting this area.

For NewsPad, the implementation of effective charging and payment mechanisms would be critical when a future proper service gets nearer operation. So would they be issues of pricing and potential markets. Here it was anticipated that, at the very beginning of NewsPad's learning process, it would be difficult to compete on cost with the cheap newspaper of today. In addition, EP's marketing department questioned that present readers of the paper version of *El Periódico* would be the first market adopter for NewsPad. The 'paper culture' was different from the 'screen culture.' For this reason, they suggested that the more likely initial customers were the people who watched *Telediario* (telejournal) or read *El Periódico Online* or the CD-ROM version.

During the life of the project, these were issues the constituency needed to keep close awareness rather than trying to solve. Indeed, it was clear that the pilot approach could only work through free provision of the prototype system to the users who would contribute their time to make the pilot possible.

6.3. *The instrumentalization of the constituencies approach*

In parallel with advances in the core technical dimensions, TechMaPP began a series of methodological updates aimed at making explicit the approach and mechanisms for the generation, eliciting, organization and processing of a flow of information and perceptions essential to the NewsPad constituency-building process. This is where this *observacting* story becomes full circle, by using the methodology to explain the methodology's own further development.

The overall evolution on the constituency was captured by the construction and periodical updating of an *evolving master scenario* (EMS). The EMS comes from a discussion between EP Management and TechMaPP as to how to codify methodological instruments for the new conditions of fast results. In this sense, the EMS was truly a crystallization of the NewsPad process and it was defined as the 'scenario' detailing, recording and informing the *alignment path* NewsPad was trailing along key dimensions of constituency-building (e.g. delivery platform, multimedia newspaper, authoring tools, communications, events, etc.) [9].[13] The EMS used the systematic partition afforded by *sociotechnical constituencies* (see Fig. 3) to facilitate tracking and monitoring of the complex array of ingredients and interrelations making up the NewsPad constituency-building process. The EMS was the result of a continuous assessment of, on the one hand, the state-of-the-art in areas of critical importance for the constituency and, on the other, the steps open to the consortium on the basis of its own expertise, resources and capabilities. As such, the EMS showed what NewsPad was and intended to be at given points in time and it was periodically updated during the life of the project in the light of new findings and progress.

Up to the crises, the application of the *constituencies* methodology had concentrated primarily on NewsPad's own internal alignment producing a series of Alignment Reports. It had also concentrated on the analysis of techno-industrial trends, by producing the contextual-mapping report on the evolution of multimedia in the newspaper industry [10]. The first issue of the evolving master scenario appeared in March 1995, pulling together into a systematic picture the accumulating results of various Alignment Reports [11]. Now, the methodological effort was evolving further into something altogether more empirical, namely, appropriate techniques to generate and elicit visions, perceptions and information useful to the alignment process underpinning the development of the NewsPad constituency.

Fig. 7 illustrates the major elements in this process. They are placed within two integrated levels around the NewsPad project or consortium **(N)**.

The inner box contains the *information substance* (i.e. relevant information, views, perceptions, visions, etc.) and their sources (i.e. experts, readers, potential allies, and second sources). The outer box contains the *eliciting mechanisms*, closely placed to their main, not exclusive, target sources. Thus, monitoring of literature was largely

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[13] It is an adaptation of the more common use of the concept of scenario, which typically construct alternative scenarios as a way of anticipating responses to a variety of possibilities.
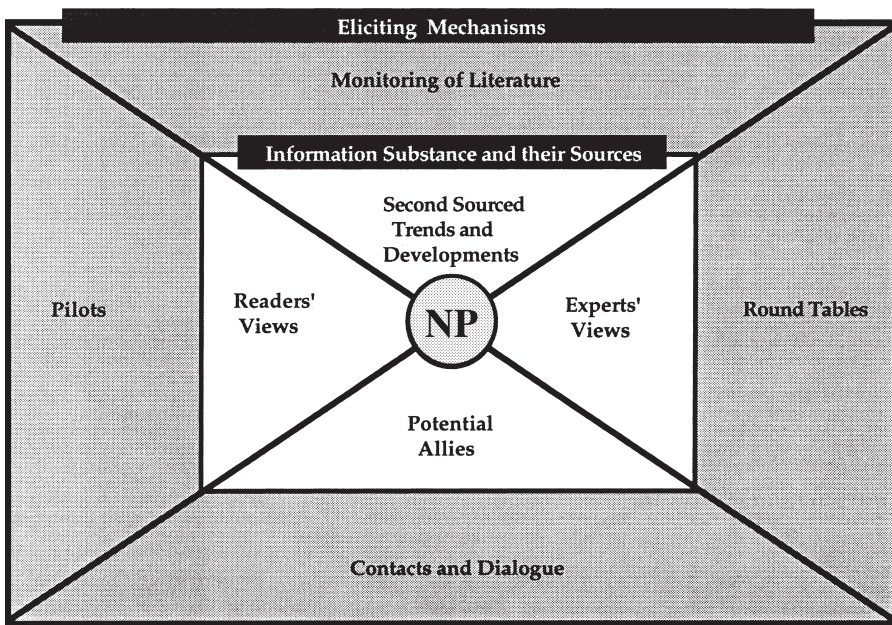
Fig. 7.   Substance and mechanisms of Newspad's alignment process.

responsible for the input of information on relevant trends and development into NewsPad's evolution. Round tables and pilots were responsible for the input of relevant expert's views and readers' views respectively. Contacts and dialogue were the mechanism to channel information and even possible collaborations with potential allies sharing a similar experience to NewsPad.

   Monitoring was a traditional search structured around the partition and mapping of critical issues for the constituency (see Fig. 3). Periodical issues were circulated to all partners. *Contacts and Dialogue* were part of the constituency-building activity geared to promote relations with organizations facing problems similar or relevant to NewsPad, particularly, newspapers, advertisers, media lab, etc. This aspect was now exercised more cautiously given the disappointing experience of the early external constituency-building. *Round Tables or focused groups* were about capturing the visions and views of experts or other audiences in areas of relevance to NewsPad development. A variety of techniques were implemented depending on the purpose of the gathering (e.g. brainstorming and Delphi-type nominal group technique—NGT).

   Pilot and User Methodology was one of the most important methodological aspects because it was critical to have alignment between the state of the technology and the type of pilot suitable for constituency-building in the long term. Pilots were conceived as the start of a controlled dialogue with user-consumers regarding the portable platform, the content/navigational concepts and/or the integration of both. Treating the platform and content as two separate products was tactically convenient for two reasons:

- the availability of the *integrated* platform/content system was uncertain,
- hardware and content could truly be seen as separate products each covering broader commercial outlets than that confined to their overlapping.

The NewsPad constituency was now advancing on several fronts and against time. This meant a strong concentration of partners on their work areas with a potential loss of interaction given the need to 'freeze' and deliver. The previous interaction and the clear complementarity of hardware and content were the guarantee of alignment at the EP–Acorn core driving the project. Also, the availability of EP's multimedia prototype gave Acorn a practical working content to refer to.

7. The public emergence of NewsPad

Confidence was back for the consortium to start targeting external constituency building actions [level c of diamond of Fig. 4]. During the past few months some action had taken place, but mostly confined to general presentations at newspaper meetings in Spain.

This time the action went further, NewsPad was out not just to present but to engage audiences for direct contributions to the NewsPad process. A phase of more intensive round tables leading to the pilots started. At the same time, TechMaPP began organizing the international conference iTV96 with the intention to provide a major arena for a first public showing of NewsPad.

A Round Table on 'Interactivity in the Future Multimedia Newspaper' took place in Edinburgh before the close of year 1995. The question posed was: *What interactive services or activities can the 'multimedia newspaper' offer in order to enhance its commercial appeal*?

The implementation of nominal group technique and a Delphi-like postal follow-on produced a wide range of ideas on interactivity as well as an indication of expected prices levels for a platform/service such as NewsPad.[14] Table 3 gives the selection of top 'interactivity' items scoring over 60 points out of a possible total maximum of 90.[15]

Among selected results, most participants (75%) indicated a level of price below £500. This suggested that systems such as NewsPad were perceived as belonging more to the consumer electronics market than to the computer market. There was also indication that the access price for a mass market service such as NewsPad is likely to be between £0.30 and £0.50.

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[14] The 9 participants had a variety of backgrounds including technology analysts, engineers and psychologists working on human interface.

[15] The marking range per item was 0–10 for each of the 9 participants, making 90 the possible total maximum per item.

Table 3
Top selection of interactivity items

	Total marks
Personalization	77
Live, real time updating	77
Added functionality (e.g., word-proc, printing)	70
Ability to subscribe to specialized services	69
Tracing stories (threading)	68
Immediate booking	67
Censorship/privacy	64
Alternative I/Os	62
Links to historical services	61
Highlighting, cutting (archiving)	61
Access to contextual information	61

7.1. NewsPad sees the light of day

In December 1995, NewsPad left the doors of Acorn building and Cambridge for the first time. It headed for Germany where EP and Acorn were presenting NewsPad at the IFRA Conference. This meeting was successful for NewsPad as the system attracted a great deal of attention from a substantial part of the audience of Media Managing Directors attending the event. In particular, the Director of the Initiative for the Newspaper Electronic Supplement (INES) was extremely interested in News-Pad and he raised the possibility of running a usability test of the NewsPad system at INES's lab. This test would lead to a report to their membership of 65 newspapers, thus enhancing the exposure of NewsPad. This was an important contact for the build up of the constituency, although the usability test was something that would have to wait until NewsPad was more developed and robust to face such scrutiny. At this stage NewsPad needed to remain in the more friendly and controlled 'incubator' environment of the consortium. It could only go to level [c] of constituency building of the hand of Acorn parents.

EP continued to conduct internal round tables on multimedia newspaper and advertising concepts. CARAT Expert was beginning to contribute to the area of advertising. On the communications front, EP was needing ammunition to argue the News-Pad communications inside the company. ICT produced a working document on the state-of-the-art of different communications options for NewsPad. This dealt with aspects such as technology, prices, commercial contacts for cable, satellite and telephone options. It reached the tentative conclusion that perhaps the only effective alternative for the development of an integral NewsPad system in the near future lies with the cable network.

For the coming NewsPad pilots, however, the consortium was concentrating more fully their efforts on the integration of platform and content rather than on accomplished communications alternatives. Work at EP and Acorn suggested that the first set of completed prototypes might be delivered during May/June 1996

enabling the start of pilots Barcelona. The consortium thought that a second-version improved machine might be produced towards the end of the project.

NewsPad's strong alignment with Acorn was illustrated by the public exposure the company was giving to the tablet. It had been made public in Acorn's web site with a full picture showing a page of EP's multimedia newspaper demonstrator. This first picture of NewsPad ever to go public was the one in Fig. 1. Even more significant, Acorn was saying that NewsPad was available in:

- Sample format
- Fully licensable design
- Full-scale Production (subject to order lead time).

The picture also testified to the initial steps in the integration of the platform with EP's multimedia content, and ultimately, to the fact that this was the result of a European collaboration. The range of NewsPad technical advances was completed by Archimedes work on linker and filtering software for personalizing news reception in accordance with the NewsPad user's selection or profile. This progress in all fronts was bringing the project closer to a definition of the global architecture of the News-Pad system, including portable platform, authoring tools, newspaper content and communications system. Interacting with it all was the development of the constituency methodology itself. The pilot stage was now approaching and the question to TechMaPP was: what are the practical instruments to tackle this phase of constituency-building and the dialogue with users? This practical demand stimulated not just a set of practical procedures but further theoretical development of the constituencies environment itself.

7.2. Constituencies, contextual usability, pilots and future plans

The start of pilots was envisaged for May/June 1996. User consumers were to be engaged for the first time and this meant further systematic development of the constituencies programme particularly in dimensions [1c] and [3c] concerning household governance and target constituents. This provided the stimulant for the integration of the constituencies approach with another strand of TechMaPP research developed by Derek Nicoll out of his involvement with Online Media in the Cambridge trial of set top box and interactive television. Nicoll's *contextual usability* [12] enables a systematic approach to user research and fitted well with the present requirements of the constituencies methodology.

Contextual usability systematically decomposed the overall use process into the four dimensions of:

- *use*—concerned with who [uses], what [product/service], why [for which reason], where [public or private use], when and for how long [time and duration] of use
- *usability*—concerned with how easy the product is to use from the consumer's perspective
- *usefulness*—concerned with two aspects. The first is apparent or anticipated usefulness such as that perceived via advertisements, and the second is the embedding

of the system into the individual lifestyle and everyday activities of household members

- *usage*—concerned with the patterning and formation of habits of use [who, at what times and for how long].

Fig. 8 illustrates the integration of the diamond of contextual usability containing the various dimensions of the use process with the diamond of product-consumer alignment containing the various dimensions of alignment involved in the market diffusion and consumption of a technology such as NewsPad.

At the centre of the top diamond is the evolving technology of the NewsPad constituency. The following alignments were critical:

- *dimension (1)* concerning the capacity to deliver what the 'consumer/reader' will want in terms of functionality and cost
- *dimension (2)* concerning at least three alignment directions (i) perception alignment between NewsPad developers and 'readers'; (ii) alignment of NewsPad specifications to 'readers' preferences and requirements; and (iii) alignment of 'readers' to NewsPad solutions
- *dimension (3)* concerning the alignment of the NewsPad system with the *governance* and priorities of the household and individuals' behavioural patterns
- *dimension (4)* concerning the alignment of NewsPad with other technologies populating the market and household environments.

The *use* dimensions of contextual usability related clearly to the dimensions of sociotechnical alignment. In particular, as the shaded circle of Fig. 8 indicates, CU opened up and revealed the nature of alignment dimension 2 (target consumers' alignment) of constituency building. Prior to being faced with the need to generate a practical approach to pilot and user involvement in general, alignment 2 of the constituency methodology had merely identified the intrinsic role and importance of consumers in the process of constituency-building. Now, the diamond of CU deepened this understanding by systematically identifying and separating the key component dimensions of use, usability, usefulness and usage.

Overall, the arrows on the left hand side of the diagram in Fig. 8 indicate the following relations:

- *relation between CU's usefulness and usability and alignment dimensions 1 and 2.* This acknowledged that, for any user, the realization of product value and easiness of use (or learning to use) are both influenced by the nature and maturity of the *used product* (technology) as well as by the specific nature of the *use purpose* (target problem) designated to the product (technology). Thus, if a new consumer product is too complex, this will most certainly be reflected in difficulties in usability and the speed of the learning process. Likewise, if the target problem is too demanding for the available technology, this will be immediately affect the perception of usefulness of its performance
- *relation between CU's use and usage and alignment dimensions 3 and 4.* Specifically, *use* and *usage* with their focus on the experience and formation of patterns of use are both strongly conditioned by the existing and evolving governance of
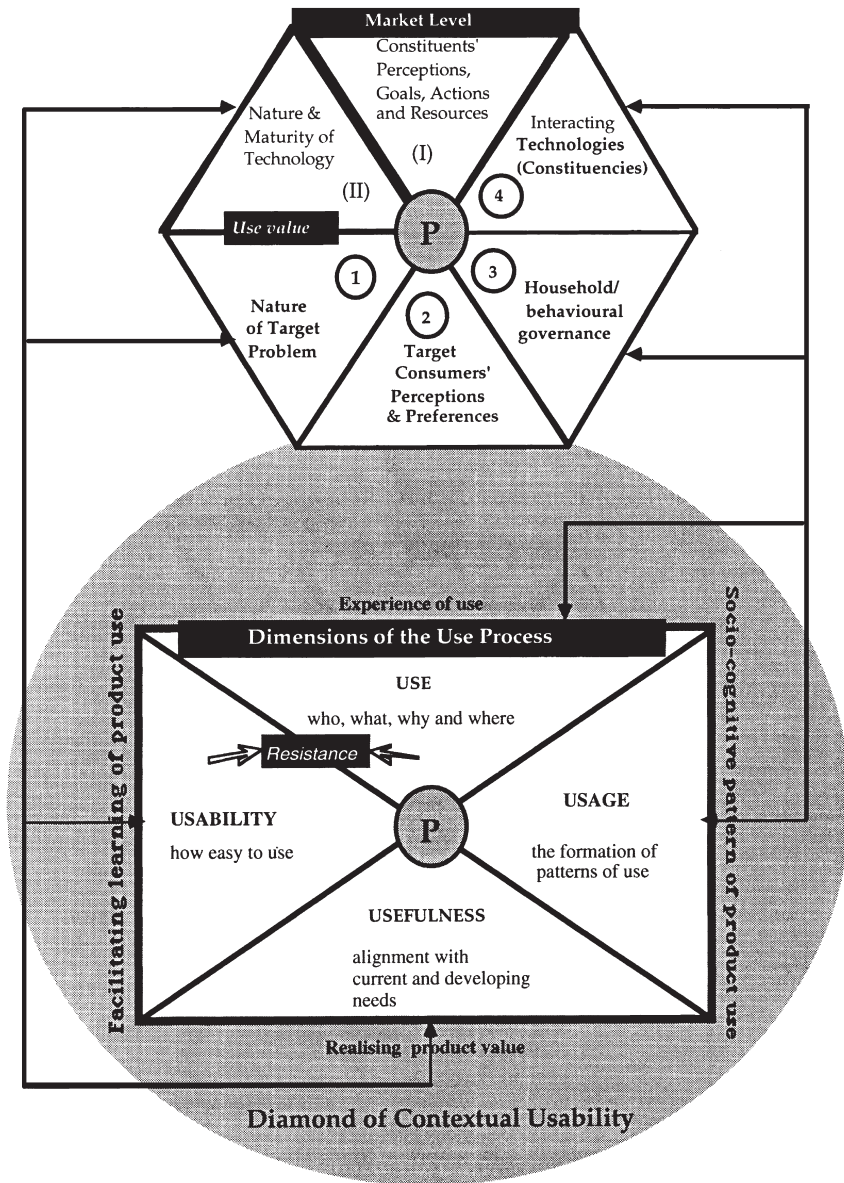
The Diamond of Product-Consumer Alignment

Fig. 8.   Integration of sociotechnical alignment and contextual usability.

the use context as well as by the behaviour of users themselves. At the same time, governance is already the result of previously adopted and used technologies (i.e. interacting technologies), which makes them an intrinsic ingredient to the process of formation and reformulation of behavioural patterns of use. Indeed, the practice and context of use (involving interacting technologies) mutually shape each other so closely as to become inseparable parts in the formation of socio-cognitive patterns of product use.

TechMaPP was now confident that the insights which emerge from this integration of contextual usability and the process of sociotechnical alignment provided a powerful and systematic way to tackle the controlled involvement of users in the pilots and in the more general process of NewsPad constituency-building.

By early 1996, TechMaPP released the document *Contextual Usability and the Alignment of Users and Technology in the Development of NewsPAD: Towards a Pilot Methodology* [13]. It argued that the specific blend of techniques to be implemented in the NewsPad first pilot must suit the present circumstances and state of development of the constituency. An assessment was given of these circumstances and state of development, consciously incorporating some commitments such as the number of available platforms for the pilots. Table 4[16] contains the main points of the assessment as perceived by early 1996.

In these circumstances, TechMaPP argued for the flexible application of contextual usability to what can be meaningfully achieved. To start with, it would be difficult to obtain meaningful patterns of domestication of the present technology, since detection of shifting patterns of *usage* would require a longitudinal approach of at least a few months of 'realistic-full-service' pilot (maybe for second pilot or even later in a possible full scale trial in a second NewsPad project). At present, it would be possible to obtain knowledge about users' current patterns of usage involving other technologies; and, following the availability of the tablet, knowledge about users' *perceptions* of what could be the possible changes in usage if they were to acquire a 'full NewsPad service.' NewsPad constituents would also obtain 'alignment' information regarding *usability* and users' requirements and preferences for them to join the NewsPad constituency.

With this in mind, the following actions were suggested covering the full period from early-March to end-September 1996, including the time for the first public exhibition of NewsPad in iTV96 international conference.

- Release of Methodology document to the consortium (March 1996);
- Release of NewsPad platforms (May 1996);
- Start of pilot (May 1996);
- High-profile demonstration and event-piloting of NewsPad in the iTV96 Conference in Edinburgh (beginning of September 1996);
- Repeat during OMI conference in Berlin (end of September 1996)

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[16] This picture comes from a great deal of collaboration between TechMaPP and EP, particularly with Xavier Bru from the EP's Marketing Department.

Table 4
Assessment of NewsPad circumstances by early 1996

- The NewsPad system exist in prototype form. The delivery platform has developed in interaction with the service providers but with no interaction with user-consumers. The content has been developed by the service provider;
- The NewsPad platform and content are products which can stand on their own and whose market diffusion may happen independently of each other;
- Both the NewsPad delivery platform and content are not final products ready for mass-market launch. They are developmental prototypes in need of further development. This means that users will be faced with less than satisfactory features in terms of cost/performance criteria;
- The limitations of present NewsPad technology means that the first pilot is likely to be limited to 'work' or 'home' contexts. The multiple contexts of the portable NewsPad system will be difficult to assess at this stage.
- The number of available Newspad platforms for the first pilot is limited to five.
- The content will not provide a 'full service' simulation with changing news, features, etc. It will demonstrate the basic concept of NewsPad with limited navigational depth. The user could navigate for about five continuous hours without starting to repeat the content.
- Given the experimental character of NewsPad, an Instruction Manual may not be available as a means of introducing the system to the user.
- El Periódico's marketing department has made available data on their current readership, primarily of a demographic nature. This shows that El Periódico's readers are spread rather evenly across the 18–49 age range. The paper is predominantly read by middle class men across all age ranges. Starting at 14, their education is primarily vocational and professional training. In the range 14–24, students predominate, but over 30 EP's readers are mostly family heads in employment. The majority of EP's readers does not possess personal computers or video recorder. Nevertheless, in the 'youth' 14–24 age range more than 50% possess a PC; and over 50% of the teenager 14–17 range possess a video recorder. Only a minority of EP's readers read magazines and very few read specialized computing magazines such as *PC Magazine*, *PC World* and *Super PC*. In addition, EP's readers are not great TV watchers. For most age ranges and TV channels, the proportion of 'watchers' is $< 50\%$ [27].
- El Periódico on-line and CD-ROM have a readership base which is more educated in the intricacies of the Internet and multimedia; EP's Marketing Department have access to this base of 'readers' and will try to make Internet data available to Newspad.
- Dialogue with EP's Marketing Department suggest that, in their view, the first-users of NewsPad will not be the 'paper'readers of El Periódico. They think that readers of the on-line and CD-ROM versions of El Periódico, or Telediaro (TV) audiences, may be perceptually closer to NewsPad appeal (and potential domestication).

- Preparation of NewsPad II proposal to the Commission (to be determined)

The full implementation of the actions depended strongly on the timely availability of a working portable platform and this was tested in the months to come. Indeed, the date of May 1996 for the start of pilots proved optimistic.

Solving the technical problems to get the platform ready to face piloting was proceeding more slowly than anticipated. Thus, pilot preparation was still the name of the game as the Commission's review of the project came at the end of May 1996 in Barcelona. Nevertheless, the platform available in Barcelona was a performing machine. In addition, EP's new work on the system for automatic production of a small-scale multimedia content for the pilots was impressive, as it was the work on communications and methodology.

The review identified the need to define an overall system framework as an important step into tying together more closely the work of partners into a common future direction. It is important to remember that originally this definition was left open to avoid closing options at too an early stage in the life of the project. This meant that the work on the core portable platform and content had proceeded with no reference to an explicit overall NewsPad system definition. Now, the time had come to make such a definition. Acorn took the commitment to produce this formal system framework and the partners agreed to comply, after all, much of it was known from the various exchanges and interaction already occurred in the project.

The Commission expressed their expectation that the coming pilot activity should be an the opportunity to demonstrate that NewsPad was a truly integrated system. In short, system integration and pilots were the key to the present stage of development of the NewsPad constituency.

Following the Barcelona gathering, NewsPad prepared for a strong show during both the iTV96 conference in Edinburgh and the major European IT (EITC96) Conference and Exhibition sponsored by the Commission in Brussels. Both events will enable NewsPad to show active presence in high-profile events. Indeed, in the case of the iTV96 conference, the consortium was to be at the forefront of the event through TechMaPP's organizing role, and in the case of EITC, NewsPad should be clearly positioned among the most innovative products on show.

8. A world's first: NewsPad in iTV96

Acorn was racing to meet the September deadline set by iTV96 for the first show of a working array of NewsPad platforms. If successful it will be the first serious public demonstration of a number of portable interactive multimedia colour tablets prototypes in the world. In parallel, Acorn was working on the definition of the system framework and a short paper for publication in *RISC User* magazine. The idea was to have plenty of reprints to circulate during the conference, thus facilitating the explanation of the system to a public who had not seen anything like it before. TechMaPP was making sure that NewsPad would have a privileged position in the Conference's programme and exhibition and it was also preparing the running of an 'antenna' pilot taking advantage of the exhibition. EP was supporting the integration of multimedia content, ICT run a first pilot on content in Barcelona and CARAT produced a first analysis on advertising in the new media. These pieces of NewsPad constituency building were fitting easily together, and the September deadline was providing the heat to deliver the working prototype and the system framework where it belonged.

8.1. The system architecture

The system architecture was proposed by Acorn at the beginning of July 1996 and it was rapidly confirmed by all other NewsPad partners. It dealt with the full scope of the information flow from the authoring of the multimedia news items

through linking, broadcast, filtering, consumption and finally feedback (interactivity). This proposal was largely contained in Alex Bienek's article "Making the News: The Story of NewsPAD", published in *Risc User* in October 1996 [14]. For the NewsPad constituency this was highly significant given that it was really the first time that a NewsPad System Architecture had been made explicit—clearly a reflection of the ground-breaking nature of the process.

The architecture essentially confirmed the NewsPad philosophy that: 'To exploit the economics of electronic news dissemination fully, it is necessary to sell the news information to as many people as possible as quickly as possible and as cheaply as possible. The correct medium to achieve this feat is clearly broadcast' [15]. This made the digital NewsPad tablet a key element in the electronic news distribution, following the trend towards portable or transportable devices, the so-called Personal Information Appliances (cordless phone, cellular phone, portable CD players, PDAs, laptop computers, etc.). The NewsPad service then would add value (distinguishing itself from the traditional newspaper and TV) through personalization, interactivity, updating and access to a much larger source of news. The NewsPad system would address all these requirements. It would provide video and audio clips for headline stories, in-depth coverage (as available for the stories), selectively filters the news information against a user's interest profile. Unlike in the case of Internet, for instance, the processing power for personalization would reside in the platforms themselves rather than inside a central server. This genuine broadcasting approach (as opposed to webcasting) avoided the bottlenecks produced as the number of readers increases. In fact, the data broadcasting server system would remain the same no matter the number of readers. Interactivity was essential for users to respond to adverts and surveys, send letters, enter competitions, etc. and it was most likely to be provided via either cellular or land-line modem, with the data being stored in the unit until its connection to the base (docking) station enabled transmission, thus implementing batch feedback. Conversational back channel transmission had to be confined only to specific applications (Internet surfing), since it would use expensive communication channels (e.g. GSM) and would have a much narrower bandwidth for portable appliances.

8.2. *Testing NewsPad content and advertising*

July 1996 was a month of considerable activity for NewsPad. EP and ICT conducted a controlled pilot on the usability of NewsPad multimedia content, i.e. the access and navigation system implemented by EP's product. A mix of ten users[17] were invited to the premises of El Periódico to interact with the NewsPad content loaded into Apple Macs (NewsPad platform was not ready for this kind of test yet). Specifically, the mix included technically aware journalists, multimedia application and

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[17] This included users who know about IT and are familiar with the use of computers, internet, etc. as well as 'normal' users. Specifically, the mix included technically aware journalists, multimedia application and graphic communications experts, and persons without any specialization.

graphic communications experts, and lay users. The pilot found that journalists tended to focus their inputs on issues of access and organization of information, ease of use and portability. The technical group focused on technical features such as compatibility, multimedia environment and interactive capabilities. The lay users showed a complete lack of understanding of the concept of 'multimedia newspaper' and of the future possibilities. Their suggestions tended to be general such as ease of operation, veracity, speed, but lacking in concreteness.

Before proceeding with the test, ICT asked the user group to list their preferential features for a possible multimedia newspaper. These are found in Table 5.

Clearly, the results of ICT coincided with those of TechMaPP's Round Table on Interactivity (see Table 3). The comparable items of the two events are shown in italics in Table 5. Following this exercise, the piloting group tested the NewsPad content and made an assessment of exciting as well as problematic aspects. The exercise was completed with a number of suggestions for improvement. Table 6 lists a selection of these three aspects.

For EP this was the first time that the NewsPad multimedia content prototype was subjected to a deep systematic scrutiny by a selected mix of users. The inputs clearly offered valuable guidance for further refinement of the product and EP set immediately to work on a revised version which sought to integrate the most important findings of the pilot.

EP was also working on the integration of NewsPad content with the portable platform. This had proceeded more slowly than expected due to difficulties residing in the platform's Micromedia Director (MMD) player. It had now become clear that a more powerful version of the MMD Player was required to enable visualization of video in the format Acorn Replay. Acorn was paying attention to this problem and expected to have the platform ready to integrate the EP content, if not for the conference, at least for the first integrated NewsPad system pilot in Barcelona. Real-

Table 5
Preferential features for a portable interactive newspaper—Barcelona content pilot

- Light and useful when transporting it
- *Constant updating of news, with automatic warning for new news bulletins*
- High interactivity and ease of use
- Easy access to content, fast and attractive navigation
- *Possibility to select and restrict incoming news*
- *Offer of additional services*
- Information storage capability
- Possibility of video, images and sound
- Possibility of thematic search
- *Access to previous newspaper editions*
- *Printing facility*
- *Compatibility with other electronic equipment*
- Easy to charge
- Direct communication with advertisers
- Supplement information with reference works
- Prices similar or inferior to a conventional newspaper

Table 6
Assessment of NewsPad content and suggested improvements

Exciting Aspects:
- Animated images
- Design and presentation of news
- Infographics
- Access to complementary information
- Automatic reading of news (sound)
- Carrousel concept of news presentation
- Games

Problems in the Navigational System
- Slow response
- It is not clear which text or zones are 'touchtone' active
- Automatic reading of headlines is hard to des-activate
- There is not indicator (clock?) for the user to know that s/he has pressed correctly or not
- Selection zone on screen is to narrow
- Icons are not explicit enough
- Some fonts are not clearly legible
- Video are of low quality
- Sometimes lack of synchronization between audio and image
- Not possible to listen to complete interviews since each paragraph requires activation

Suggested Improvements:
- Unified system of icons
- More effective Help system containing list of icons, colour identification of video, voice, photographs, etc.
- Possibility of navigating backward and forward easily
- Possibility of listening to all text
- Improve distribution of long text for change of page
- Better presentation of last minute news
- Stronger presentation of most important news, everything the same at the moment
- Add more services for the user (e.g. traffic news)
- Language options
- System identifying between news already visited and those not yet 'read'

time updating of news, however, was unlikely to happen for a pilot in a household environment. It might however be tested in the premises of EP. Plainly, the alignment of technology to technology [dimension 4—Fig. 4] was conditioning the nature of the pilots.

Good news came from Archimedes who were working on the personalizing software. The filtering software will allow the platform to discriminate the news and information in accordance with selections defined by the user, hence personalization. News will be selected in accordance with the users profiles. To achieve this purpose, Archimedes has implemented a two level item selection procedure. The first level is based on keywords describing the topic of a multimedia object and the second is based on text analysis. Both are compared with the user profile to generate a relevance rating which is then used to accept or discard a specific object.

The area of advertising also showed significant results, as CARAT released the

conclusions of their first study on the nature of interactive advertising [16]. It distinguished 6 rules for successful interactive advertising (Table 7):

For NewsPad, the report concluded:

(1) NewsPad must be *interactive*. If there is no information feedback, a great part of multimedia advantages are lost.
(2) Advertising in NewsPad must *follow the 6 rules* defined previously, and at the same time *respect space and positioning constraints*.
(3) *Any kind of advertiser* can make use of NewsPad: it all depends on user target as in the traditional media.

CARAT was also working on a further report on *The Marketing of On-Line Advertising Space: Which Methods and Which Tools*? This study was looking at three main elements: audience measurement approaches; online marketing tools and services aimed at advertisers; and home shopping and tariffs. CARAT aimed to offer a number of recommendations for advertising in NewsPad.

8.3. The iTV96 conference

Back to where this story started! September 1996 came and four NewsPad platforms headed North from their home in Cambridge to the public limelight of Edinburgh iTV96. The conference was highly successful and NewsPad was quite clearly the star of the Exhibition, attracting a great deal of attention and praise from participants. The NewsPad stands was visited by many people from all ages who were attracted by the strikingly different appearance and concept of the system as compared with the more traditional Internet and interactive TV sets.

Acorn led the demonstrations, spreading reprints of Bienek's paper *Making the News* which had arrived just in time for the event. Many business cards were exchanged between Acorn and visitors from many other companies.

In parallel with the promotional demonstration of NewsPad, TechMaPP implemented an *antenna pilot* taking advantage of the stream of users visiting the stand to play with the four platform. The operating machines were all connected to the main, but could be disconnected at any time and continue working on battery power to demonstrate portability. The pilot was modified to suit the more limited content integrated into the platform as a result of the difficulties with the MMD player. In particular, it was not possible to survey in full the navigational interaction

Table 7
Rules of successful interactive advertising

1. Bring added-value to the user
2. Integrate in the medium without imposition
3. Target and personalize
4. Organize content and create immediate pleasure
5. Establish a relationship with the client
6. Be evolutionary

of the newspaper content. The action concentrated on the filming of the interaction between visitors and the NewsPad platform. Table 8 contains the main conclusions to emerge from the observation and analysis of the video about this first NewsPad encounter with the public.

The Edinburgh show gave NewsPad external constituency-building a tremendous boost and profile. NewsPad was prominently reported in *The Independent* as a prelude to the many articles which followed in the coming weeks as a result of a fast promotional action implemented by Acorn and TechMaPP. This action combined press campaign with attendance to a variety of high-profile events.

Immediately after the conference, TechMaPP wrote an article and sent it to a variety of national dailies. The same article became the foundation for Steve Outing's web article 'Digital Tablet Makes Strides in Europe and U.S.' This was published in the prime newspaper web site *E and P Interactive* (the electronic version of *Editorial and Publishing*) in October 1996. This article clearly confirmed NewsPad's world leadership in the digital tablet field.

Acorn was faced with many enquiries from journalists, so they decided to put out a Press Release which led to a spate of articles on NewsPad, including a fully-pictured article in *Byte* magazine in February 1997. Interestingly, many of these articles suggest that the NewsPad system was almost operational. *Byte* for instance reported:

> A group of readers of El Periódico de Catalunya, Barcelona's largest Newspaper, can now browse, personalize, and structure their own newspaper on a tablet-like computer called NewsPad. The easy-to-use device automatically updates news content overnight by encrypted broadcast transmission such as Direct Video Broadcast satellite [17].

Table 8
Observations on first NewsPad encounter with the public

- The number and variety of people visiting the stand confirms that NewsPad is an attractive product for everybody;
- People are easily driven to use their fingers to try to navigate along the content of the system;
- Young people currently at school are much more comfortable with exploring the technology as soon as they come face to face with it. They also seem to enjoy this exploration and become more easily absorbed, even though the system could offer only limited demos. Adults tend to wait for explanations and are more careful with touching the device;
- There does not seem a major difference between the attitude of men and women visiting NewsPad, although many more men did so even from the school groups;
- People who lifted the device seem to have quickly found the best position to operate it by resting it against the forearm. They did not make obvious manifestation of uncomfortability due to weight, although this might have happened given longer time of use;
- NewsPad screen get full of finger prints with heavy use and requires cleaning. Maybe the device will have to be provided with cleaning cloth, very much in the tradition of other consumer electronics products;
- NewsPad portability makes it easily 'stealable', confirming the need for security mechanisms which would make it 'un-worthy' of the effort.

Regardless of the accuracy of the reporting, the press campaign fulfilled the objective: it proved the appeal of NewsPad and successfully raised the profile of the project everywhere and most importantly in the eyes of the European programmes. NewsPad became 'one of the most successful projects of OMI,' and proudly made its way into the book of *ESPRIT 101 Successes* [18]. Furthermore, NewsPad was one of only two invited OMI projects to be at the major European Exhibition EITC96 in Brussels in November 1996. NewsPad also entered the European IT Award Competition.

Following the trail of constituency-building, NewsPad went immediately to the mid-September OMI Conference in Berlin. From here to the major industrial faire COMDEX at the US, and eventually to EITC96 in Brussels where the NewsPad stand enjoyed a huge number of visitors, including industrialists, schools, and many EC officers. Acorn gave interviews and even a short film was made of the stand. Acorn was regularly taking NewsPad to foreign trips to show the leading edge work of the company. Indeed, the platform was demonstrated by Acorn's NewsPad constituents to several other potential commercial partners in the UK, the USA and Japan, including two or three large corporations.

Of course, any such commercialization would require the development of a second generation NewsPad platform—something that in turn would most likely require the formulation of a second European project. NewsPad constituents were aware that there was a limit to the high-profile press campaign since expectations at level [4] might begin to run perilously high for what the prototype could really deliver at the time. This could generate a mis-alignment involving dimensions [2] and [3] of the diamond in Fig. 4. Thus, it was time to turn the heat down in order to align these expectations with the prototype reality of the platform and the fact that it was not really available for sale, at least not just yet. The constituency-building required concentration on the pilots of Barcelona and the decision to go forward to a second project which would be much more demanding commercially—most probably aiming to take NewsPad to the threshold of truly commercially viable products.

At the beginning of September, the preparations for the first household pilot of the NewsPad system were well under way in Barcelona. In accordance with directions coming out from TechMaPP's pilot methodology, ICT sent invitations to 100 readers of *El Periódico* CD-ROM who were residents in Barcelona. Thirteen positive responses were received. In addition, 11 other families (non-CD-ROM readers) were interested in participating in the pilot. This made for the 20 families originally envisaged for the first piloting of the integrated system.

The exact nature of the pilot, however, was conditioned by the robustness of the platform and the integration of the content. It looked increasingly uncertain whether within the life of the project, NewsPad would be able to be left alone with users (households) for a period of several days. There was no point in handing over a machine which could develop problems, thus frustrating users as well as the whole point of the pilot exercise. Faced with this dilemma, the constituency prepared for re-alignment in case the full system with 'live' daily updating was not operational on time. The philosophy was simple: if it is not possible to align the technology to the planned pilot, it is certainly possible to re-align the pilot to the capabilities of

the available technology. The re-alignment had several options. One would be to combine a NewsPad with a desktop MacIntosh. The platform would integrate a multi-media capsule for a complete demonstration of EP's multimedia newspaper concept, and the Mac would supplement it with visualization of 'live' updating of real-time news. In this case, the pilot would not be carried out in a 'home environment', it would take place in the premises of EP. Another option would favour the importance of the household environment and would integrate EP's content into a portable computer to be left with piloting families for several days, for them to play at their leisure. The NewsPad platform would be introduced for a few hours to give the users the feel for the real hardware of the future NewsPad service, but it would not be left with the families. The second option would eventually prevail as the most aligned with the state of development of the technology. It would also allow users to try NewsPad without the constraints of the controlled environment of the newspaper.

9. Leaving behind the foundations of success

9.1. Ten out of ten in Athens

In December 1996, the NewsPad constituents gathered in Athens for the periodic review of the project by the Commission experts. The review went extremely well since NewsPad was able to report advances in all fronts. The 'blitz' of public dissemination and reporting had also reinforced the perception of success and, generally, there were no gaps for significant criticisms.

In Athens, CARAT presented the conclusions of their report *The Marketing of On-Line Advertising Space: Which Methods and Which Tools?* The reports argued that the potential of multimedia is endless and went on to identify the conditions for advertisers to consider investment in electronic media. These were:

- knowledge of online media audience through audience quantification and qualification, measures of behaviour, measures of efficiency of advertising actions, etc.
- capability to integrate complex and evolving electronic media in their marketing and communication strategy, through media-planning, targeting, one-to-one marketing tools and systems, etc.
- knowledge of sales conditions of different media through contacts offering clear tariff and marketing solutions adapted to their budgets.

However, there were many obstacles as the operational means to prepare, support and pilot communication operations were limited in their development and measurement aspects. In particular, CARAT identified:

- multiplication of tools which evolve very rapidly;
- non-homogeneous audience calculation methods;
- absence of widely accepted indicators; the terminologies of electronic media are not the subject of consensus at national and international levels, and
- different tariff policies on on-line home shopping.

In spite of these difficulties, CARAT concluded that the market was getting structured, players were getting organized, trying and finding solutions and inventing new techniques of advertising and marketing. The train was moving, it was advisable to get on it and, if appropriate, to drive it [19].

The consortium left Athens with the satisfaction generated by the perception of success. The NewsPad constituency had crystallized a technology where others had not, although it had not been easy, and this only reinforced the sense of achievement. The consortium had entered the realm of information appliances and multimedia information laying the foundations for further developments either individually or collectively. Without NewsPad the organizations would not have had this choice in front of them. Now it was the turn of the final household pilot in Barcelona.

9.2. The final Barcelona pilot

The household pilot of NewsPad took place from 18 February to 4 April 1997 and involved a total of 21 families [20]. As defined already, the methodology combined the use of a portable PC, which was left with the household, and the NewsPad platform which was selectively introduced for limited periods of a few hours and in the 'caring' presence of ICT researchers.

The results tended to confirm the pattern of responses established by previous consultations. Thus, Table 9 shows the most exciting aspects as selected by the users (i.e. the total number of users who ticked the item). Indeed, a comparison with Table 6 reveals significant similarity regarding the top 5 items.

The pilot also enabled users to assess the quality of navigation of NewsPad content by asking them to give a score from 1 to 10 to a number of relevant statements. The results are given in Table 10.

On the whole, the navigational system was scored above average, although the marks of the last two items in Table 10 suggested uncertainty as to the meaning of icons and the flow of responses by the system. On the other hand, 'graphics' was

Table 9
NewsPad's most exciting items

	Marks
1. Design and general presentation of news	50
2. Video	48
3. Infographics	46
4. Automatic news reading (sound)	44
5. Additional information	33
6. Carrousel	23
7. Availability of a Newspaper and periodicals library	20
8. Spectacular appearance of the front pages	19
9. Photographic quality	15
10. Games	13
11. Images setting-up system	6

Table 10
Users' assessment of NewsPad's navigation

	Marks
1. Graphics are very good	9.8
2. The way the interactive newspaper is presented is good	7.2
3. Very easy to use	7.1
4. Once you know how an option is working, it is easy to learn the rest	7.1
5. Very easy to learn how to use	6.8
6. The navigation system is very good	6.1
7. Icons and commands displayed on the screen are self-explanatory	5.9
8. It is easy to know (whenever you want) how the system is going to respond	4.8

found unequivocally powerful. Again these findings tended to resonate with those of Table 6.

Household users were also asked to assess their reaction to the NewsPad system as a whole, that is, multimedia content and portable delivery platform. On the range 1–10, the system received an average score of 7.4—suggesting a high degree of appeal.

They were also asked question regarding potential prices they might be willing to pay for the NewsPad platform as well as the news service. For the platform, the average price was 22 000 pesetas (around £110 at the time), with a high of 80 000 pesetas (about £400). This again confirmed the perception of NewsPad as a consumer electronics product. For the news service, the average monthly payment was 1400 pesetas (about £7), with a high of 8500 pesetas (about £40).

The pilotees were also given a list of optional features that might be added to the NewsPad service, and asked how much they would be willing to pay for each of them. Table 11 shows the results. The amount was for the price of the contract only. It did not include the monthly charge.

Table 11
Optional features

	Price [Pesetas (£)]
Electronic personal diary	2300 (~ £11)
Electronic dictionary	600 (~ £3)
Facsimile	7900 (~ £40)
Access to Internet	18,800 (~ £90)
Telephone	2900 (~ £15)
Television	11,200 (~ £60)
Video-conference	3300 (~ £16)
Games	3300 (~ £16)

The price given to Internet was particularly interesting, especially because in Barcelona a connection set including a modem and browser could easily be found for less than 10 000 pesetas (£50). This probably revealed a feeling that the Internet was important, but not strong enough to get to know price levels. It was also interesting to note that the price quoted for games, although not too high at 3300 pesetas, was higher than those quoted for the diary, the dictionary, or even the telephone. This pointed to the importance of entertainment features for the eventual market appeal of services such as NewsPad.

The pilot also confirmed that the relation to Internet was likely to be critical to the success of NewsPad. In particular, the culture of Internet navigation was becoming widespread and this was something whose implications NewsPad would have to consider carefully. For instance, not surprisingly, pilotees who were familiar with the Internet tended to find the NewsPad system a little bit strange. Indeed, Internet users commented that the use of standard text and symbols similar to those on Internet would be a good idea. Another Internet-related perception was the issue of charging for the news service. Some pilotees commented that an interactive newspaper will have no future unless it was free of charge. In their view, users should only pay for the portable NewsPad platform but not for the content. After all, the Internet was offering free access to the content of newspapers such as El País. In this scenario, the income generation alternative was advertising.

The household pilot in Barcelona was the last major action of the NewsPad project. In the event, it was smaller-scale than first envisaged, but it was the action most fruitfully aligned to the state of development of the integrated platform/content technology.

10. What after NewsPad project?

The NewsPad project came to an end in May 1997, having established a strong perception and record of success. The project had demonstrated the concept and prototype of the Tablet multimedia newspaper and had engaged in an effective dissemination campaign. The constituency-building process was now entering a completely new phase which required a more exacting set of alignments and commitments to advance the NewsPad system closer to commercial reality. From TechMaPP's trend mapping and Evolving Master Scenario, however, NewsPad constituents knew that commercial reality would not be possible in the short term, say, in the next two to three years. Indeed, any commercial service would require a quantum leap in technical development not just for the platform but for the integration of the entire system for broadcast multimedia news service. This meant a simultaneous quantum leap in belief, commitment and investment from the range of organizations who would be making the system technically possible and commercially viable. From the point of view of the diamond of alignment of Fig. 4, the players, activities and dynamics would have to undertake a major change at all layers [a, b, c] and under conditions of massive risk. In practice, this new quantum level was simply mis-aligned with the short-term market potential and therefore the will-

ingness of the NewsPad constituents to go down the road of commercialization in the short-term.

Instead, NewsPad constituents saw that a more realistic possibility would be to evolve rather than leap *towards* commercial reality, most likely through a major trial involving the development of a second generation NewsPad system and TV service companies offering interactive television. This would entail technical and institutional changes and expanding the constituency to involve a major distribution network enabling broadcasting and the realization of a trial multimedia news service [I, II]. It would also entail finding new financial resources either from companies themselves or from companies with the catalytic support from programmes such as ESPRIT-OMI [3a, b, c]. For companies the difficulty of investing alone was simply the high risk as there was no real certainty of pay-off in a short-term horizon. This meant that, in any assessment, the NewsPad project would take second priority to other projects with 'cash-in-hand-now' potential [level a]. A second European project thus became the only real alternative to continue the constituency-building process both technically and socially. This was tried in 1997 but, unfortunately, the proposal for NewsPad II was not accepted, ironically, because it failed to demonstrate fully that the results of a second project would clearly lead to commercial exploitation. After the first NewsPad, the reviewers felt that a second project should now lead to commercial results. The governance of OMI was now mis-aligned with the state of development of the constituency and its longer-term market view [I–II, 1c, 3b]. Furthermore, at present (June 1998), calls for proposals from the European Union have virtually come to an end for the Fourth Framework Programme. The Fifth Framework Programme is expected to issue its first call in early-1999, and this may re-open the opportunity for renewed efforts for the NewsPad system. In the meantime, NewsPad constituents continue disseminating the concept inside their companies and other organizations and to the wider public through publications such as this one. Going back to the question posed at the beginning: will Acorn be able to translate the NewsPad technical lead into a real and commercial market presence? The answer is still the same: "Only time will tell—and Europe has a less than enviable record on this part of the track".

Acknowledgements

References

[1] See section 'Back to 2001' in Clarke AC, editor. 2001 *A Space Odyssey*. London: Legend, 1990.

[2] Clarke AC, editor. 2001 *A Space Odyssey*. London: Legend, 1990:67–8.

[3] See Financial Times, 30 May 1994, p. 9. Also Fidler R. The digital newspaper: building on the document model in IFRA. Newspaper Techniques. Munich: IFRA, 1994:4–9.

[4] See Financial Times, 30 May 1994, p. 9. Also Fidler R. The digital newspaper: building on the document model in IFRA. Newspaper Techniques. Munich: IFRA, 1994:18.

[5] See also Fidler R. MEDIAMorphosis: Understanding new media. Thousand Oaks, CA: Pine Forge Press, 1997.

[6] See Sun Microsystems, Starfire: a vision of future computing, video, 1995.

[7] On the concept of "sociotechnical alignment", see Molina A. Insights into the nature of technology diffusion and implementation: The perspective of sociotechnical alignment. Technovation 1997;17(11/12):601–26. Also, Collinson S, Molina A. Reorganising for knowledge integration and constituency building in the era of multimedia product development at Sony and Philips. In: Coombs R, Green K, Richards A, Walsh V, editors. Technological change and organization. Cheltenham: Elgar, 1997.

[8] See Molina A. Innovation in the context of European R and D collaborative programmes: The case of multimedia and the newspaper industry. International Journal of Technology Management 1996;12(3):271–90.

[9] See Schwartz P. The art of the long view. London: Century Business, 1992. Also, Wack P. Scenarios: Uncharted waters ahead. Harvard Business Review 1985;63(5):73–89. Wack P. Scenarios: Shooting the rapids. Harvard Business Review 1985;63(6):139–50.

[10] See TechMaPP. The evolution of multimedia in the newspaper industry. TechMaPP, The University of Edinburgh, Edinburgh, 1994. Two papers have been subsequently published out of this study, Molina A. NewsPapers: The slow walk to multimedia. Long Range Planning 1997;30(2):218–26; and Molina A. Issues and challenges in the evolution of multimedia: The case of the newspaper. Futures 1997;29(3):193–212.

[11] See TechMaPP. NewsPad: Evolving master scenario—First consolidated report. TechMaPP, The University of Edinburgh, Edinburgh, 1995.

[12] See Nicoll D. Contextual usability: A methodological outline of contextual usability and quality function deployment in the development of advanced media products. TechMaPP, The University of Edinburgh, Edinburgh, 1995.

[13] See Molina A, Nicoll D. Contextual usability and the alignment of users and technology in the development of NewsPad: Towards a pilot methodology. TechMaPP, The University of Edinburgh, Edinburgh, 1996.

[14] Bienek A. Making the news: The story of NewsPAD. RISC User 1996;October:2–6.

[15] Bienek A. Making the news: The story of NewsPAD. RISC User 1996;October:4.

[16] See CARAT Expert. Report on advertising in new media-electronic media: New modes of advertising expression. Paris: CARAT Expert, 1996.

[17] NewsPad makes El Periódico interactive. BYTE 1997;February:40IS 4.

[18] C.E.C./ESPRIT. ESPRIT 101 successes. Brussels: C.E.C. ESPRIT, 1996.

[19] See CARAT Expert. The marketing of On-line advertising space: Which methods and which tools? Paris: CARAT Expert, 1996.

[20] See Institut Català de Tecnologia. OMI NewsPAD: Final pilot test (BCN-2). Barcelona: ICT, 1997.

[21] Molina A. Transputers and transputer-based parallel computers: Sociotechnical constituencies and the build up of British–European capabilities in information technology. Research Policy 1990;19:309–33.

[22] Molina A. In search of insights into the generation of techno-economic trends: Micro- and macro-constituencies in the microprocessor industry. Research Policy 1993;22(5,6):479–506.

[23] Molina A. Sociotechnical constituencies as processes of alignment: The rise of a large-scale European information technology initiative. Technology in Society 1995;17(4):385–412.