

Strategic Plan 2004-2007

Dr. Gareth Jones
Dr. Seán Marlow
Dr. Noel Murphy
Dr. Noel O'Connor
Prof. Alan Smeaton
Dr. Alistair Sutherland

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The Centre for Digital Video Processing Strategic Plan 2004-2007

The Centre for Digital Video Processing

The Centre for Digital Video Processing at Dublin City University is a cohesive interdisciplinary research group. It was established in 1996, received its first research grant in 1997, and in 2001 we spun off its first commercial offshoot, *Aliope Ltd*. In 2001 we also published our first strategic plan, for 2001-2004. The new plan for 2004-2007 builds upon that earlier plan and extends us into a number of new directions which are a natural evolution of our activity.

The centre has always been built on a passion to find new and useful ways of working with Digital Video and Digital Media in general, in Ireland and worldwide. We regard our mission as to operate in the domain of developing and evaluating automatic techniques for content-based operations on large repositories of digital video information. All our research efforts in image, audio and video analysis, hardware design for video processing, interface design, building and evaluating systems, search techniques and so on, all contribute towards that goal.

There are many reasons for putting together a strategic plan for an organisation. It can provide a roadmap for the future, a benchmark against which to measure progress and it can set targets. It can also be used as input into a strategic plan for a larger encompassing organisation such as the University and finally, when its lifetime has expired it can be used as the basis for evaluating the recent evolution of the organisation. This plan serves all of those purposes referencing back to our plan of 2001/2004 where appropriate.

The methodology we used to generate this plan was to hold a brainstorming session among Faculty and post-doctoral researchers during which we took stock on where we currently are and what were the likely directions in which we would proceed if things were left unchecked. We then gathered these together, along with an analysis of these, and turned these into a series of related strands of activity. This document was then written to include those details, circulated iteratively among the group for comment and amendment until the content was finalised, agreed, and published.

How Have we Performed Against our Last Strategic Plan?

In our plan for 2001-2004 we listed several targets which we reproduce here and for each we comment on whether we have achieved, exceeded or fallen short.

- 1. Over the next three years, the Centre plans to build on these strengths by slow organic growth of the Centre itself that maintains its cohesion and maintains its focus, while strengthening its interdisciplinarity. We see on average one research-active member of academic staff aligning themselves with the centre per annum, bringing us from the present seven to about ten permanent research-active members of staff by 2004.*

At the time of writing we have 7 Faculty and 6 post-doctoral researchers working in the CDVP but only the Faculty are permanent staff. We believe we have attracted any existing DCU Faculty who work in our area to align themselves with the CDVP and thus additional permanent staff would have to come from University recruiting. However,

with the downturn in undergraduate teaching in our area, our Faculty has not been recruiting academic staff for the last couple of years and so this source of new people has dried up.

2. *By Summer 2004, we plan to grow towards a complement of five post-doctoral researchers or supported long-term senior academic visitors. In addition to the sabbatical availability of DCU centre members, we aim to put funding in place to release a second member of permanent DCU staff in the Centre for full-time research on a rotating basis.*

We have six post-doctoral researchers of whom 5 are guaranteed to be with us for some time as a result of SFI and EI funding. Although none of the academic staff have availed of sabbatical leave, during 2003/2004 we had one member of staff freed from teaching for each semester (Smeaton and O'Connor) as a result of support from the DCU UDRC Recurrent Funding scheme and we have applied for a repeat of this for Murphy and O'Connor for 2004/2005. Longer term we see the redistribution of overheads from research funding which brings overheads into the University (from SFI and EU funding sources) being used to keep one member of staff free for full-time research on a rotating basis.

3. *The CDVP intends to strongly support DCU access to further rounds of PRTLTI funding by strengthening its collaboration with PRTLTI-funded centres in DCU in activities which are government funding priorities and within the chosen focus of the CDVP.*

The PRTLTI funding scheme was frozen in 2002 and has not yet resumed. When it does, we are ready to react.

4. *Over the next three years, the CDVP will position itself to avail of substantial SFI funding.*

We have accomplished this with the CDVP as a key member of the SFI-funded Adaptive Information Cluster.

5. *The Centre will continue to attempt to avail of all other relevant funding sources, both within and outside DCU, and within and outside Ireland.*

We are hugely active in seeking research funding support from SFI, EI, EU FP6, from industry and elsewhere and we put a lot of effort into this. Over the last 24 months we have submitted over 20 separate research funding proposals to these agencies and others.

6. *Over the next three years we intend to make significant scientific developments in the basic research areas of Foundations of Transmedia Applications and Digital Media Object Analysis. We expect to promote these research areas by organising at least one international workshop during the next three-year period in which these are substantive topics.*

In July 2004 we hosted the International Conference on Image and Video Retrieval which attracted 125 paper submissions, 150 delegates from around the world and helped to put us firmly on the international map in our research area.

7. *Over the next three years we intend transforming Físchlár into a platform that will support object-based transmedia information-retrieval applications (using the MPEG-4 and MPEG-7 standards) in multiple personal environments (including mobile) and also support real-world investigation of novel interface methods.*

The Físchlár system has been so developed and has spawned different versions including Físchlár-News, Físchlár-Sheffield, Físchlár-TREC2002, Físchlár-TREC2003 and we are currently developing Físchlár-TREC2004. Different versions have been deployed to thousands of users and have managed, over time, over 1,000 hours of video content.

8. *Over the next three years we shall continue to produce high quality scientific publications in conferences, workshops, journals and book chapters which will increase our recognition and reputation as a centre of excellence in our field.*

The table below summarises our publications output for recent years (2004 entry is incomplete). This shows steady and sustained growth.

Publications	1998	1999	2000	2001	2002	2003	2004
Journal	0	0	0	0	3	0	6
International Conferences	0	2	4	14	9	23	17
National Conferences	0	1	3	3	4	1	0
Total Publications	0	3	7	17	16	24	23
External Seminars/presentations	0	2	1	1	2	6	3

9. *The CDVP will undertake to maximise the possibilities for commercial exploitation of innovations and technologies developed within the Centre in DCU, consonant with the scientific imperative of information dissemination for the benefit of society as a whole and the constraints imposed by funding agencies.*

We have set up one campus company, Aliope Ltd., and at the time of writing are in negotiations with three outside companies about licensing different aspects of our work. We acknowledge and are grateful for the help given by the Commercialisation section of Enterprise Ireland and by Invent (DCU) in helping us achieve these goals.

10. *Over the next three years we intend to continue to take leadership roles in collaborative research organisations and Networks of Excellence on both sides of the Atlantic as well as extending the involvement of members of the Centre in national and EU scientific evaluation panel activities.*

We continue to act as coordinators of TRECVID, run by the National Institute of Standards and technology in the US, and are active drivers in other formal and informal networks of excellence in our field.

The Work Topics of the CDVP

The work of the Centre for Digital Video Processing can be viewed from a number of different perspectives.

On the one hand we follow three parallel strands of *basic research*, *applied research* and *exploitation*. Our basic research is directed by real world needs as defined by our applied research. Our applied research puts into practice and field-tests what we do in basic. As our applied research then looks marketable, we expect exploitation to generate a revenue stream back into the Centre.

On the other hand, the technical areas in which we work have diversified from the specific topic of video analysis to support video retrieval to include analysis and content-based applications using spoken and other audio, still image analysis and content retrieval, hardware support for video processing, video processing in niche areas such as CCTV/security video, personal content, TV news, and movies, as well as our mainstay activity of proof of concept and prototype system development in the Físchlár systems. The overlap in these is *media analysis for content applications* and because of our respective backgrounds, ranging from video compression to information retrieval, this will continue to be a recurrent theme in all our work.

We will continue to pursue basic and applied research, as well as exploitation activities and because we have grown in size and broadened our range of research topics we are in a position to categorise our work areas more generally. Thus the work topics of the CDVP are more broadly spread than previously.

Specific Strategic Plans for 2004-2007

Research Themes

The research focus of the CDVP has diversified into 5 different areas as follows:

- (1) video processing for commercial content such as CCTV, sports footage, movies, etc., and we continue to develop indexing, retrieval, summarisation and other content-based applications.
- (2) video processing for personal content addresses the specific niches of home movies and home photos. Some of the image and video analysis techniques needed here are also used in commercial content, but processing personal content requires much richer information such as location, history, etc.
- (3) advanced video analysis and event detection addresses challenges such as 3D analysis, infra-red image processing and advanced semantic feature detection,
- (4) hardware support for video processing is a small but important area of the CDVP and addresses the design of efficient and effective hardware for processing video and image information.
- (5) the CDVP has always placed much emphasis on prototyping our ideas through system development as this validates our work and we will continue with this practice.

Over the next 3 years we will continue to pursue work in the 5 main areas listed above

Size, Composition and Internal Organisation

We believe that the CDVP has reached a sustainable size in terms of numbers and composition and that the competitive research funding environment of SFI, Enterprise Ireland, EU FP6 and

FP7 is conducive to us bidding successfully for funds to maintain that size. We are particularly encouraged by advice being given to the government from organisations such as ICT Ireland about diversifying the range of funding support mechanisms and putting more emphasis on applied research funding. We will continue to produce high quality output in terms of publications (with more emphasis on Journal publications than heretofore), we will increase our numbers of graduated research students (especially PhD graduates), and we will continue to patent our work where appropriate (increasing from 5 in the last 2 years). The issue of whether we should apply to upgrade our status within the University from University Designated Research Centre (UDRC) to National Centre is one which we will keep under review but we cannot include a recommendation on this here as it will depend on changing circumstances within the University. We also believe that our internal organisation and the way we run the CDVP is sufficient and works well though we are at a disadvantage in that we are spread over 4 different locations throughout the Faculty as a result of the history of how we have evolved and the School-based manner in which space is managed in the University.

Over the next 3 years we will maintain our present size and composition through bidding for research funding from outside the University. We will keep under review the question of whether we should apply to upgrade to National Centre status and we will strive to relocate our labs to either a single location or to neighbouring and adjacent laboratories at worst.

Diversify Funding Sources

We are aware that the future sustainability of the CDVP could be at the mercy of forces outside our control, namely the existence of national and international research funding agencies and to counter this we will diversify our funding sources and include a greater component of collaborative research with industry in Ireland and abroad. This will be done through a combination of licensing our existing work (which will generate revenue for the University) and joint development work with industry. Clearly, this will fund applied rather than basic research activities but this work will feed back into our basic research agendas, and indeed may provide opportunities for basic research funding in the future. While the University has a clear policy on the distribution of overheads from research grants, and we welcome that, the University policy on distribution of licensing revenues is not clear and this needs to be addressed by the University.

Over the next 3 years we will diversify our funding sources through licensing and joint development directly with industry.

Technology Transfer Activities

To date we have set up one campus company to exploit one particular version of our Físchlár system. The possible payback to the University from this is too long-term to be of any real potential for generating research funding in the foreseeable future and so we will concentrate on licensing technology and know-how as our main technology transfer activities, though we will also keep the option of a second campus company.

Over the next 3 years we will seek to maximise opportunity for technology transfer through licensing of technology and know-how.

Maintain and Increase our Collaborations

Collaboration with other research groups has always been an important aspect of our work. At the time of writing we have formal collaborations through our SFI and FP6 funding, and informal collaborations with about a dozen other groups. This adds much value to our work and is something we put a lot of effort into. We are particularly interested in collaboration with like-minded groups who also work in video analysis, indexing and content-based operations, as well as with groups who work in nearby and related areas, such as our current collaborations with the NCSR in DCU (sensor networks), and with the Computer Science Department in UCD (personalisation and agent technologies).

Over the next 3 years we will maintain external collaborations with as many research groups and industry partners as we can comfortably maintain, both funded collaborations and just as importantly, the unfunded ones. We will actively push for the SFI-funded Adaptive Information Cluster to be extended and enhanced and we remain always open and available to take advantage of opportunities offered for internal collaborations through the resumption of the PRTL1 or through other opportunities offered by the DCU Educational Trust or others.

Showcasing the CDVP

Over the last few years we have put together a suite of impressive demonstrations of our centre's research activities. We believe this to be important because it gives us some visibility to our funding agencies and funding partners which helps justify their investments, it showcases the research capabilities of the University and of the country, and it helps to attract further funding and collaborations. Between May 2001 and Aug 2004 we hosted 143 visiting groups to the CDVP ranging from political showcasing (including a US Congressman), IDA or EI hosted visits from potential and present inward investors into Ireland (including SmartCom Media, Samsung, Vodafone, Google, Microsoft, Ricoh and others), press visitors, indigenous companies (Eircom, Europlex, Kadius, DV4, and others), and of course other researchers.

Over the next 3 years we will continue to host visits and tours of the CDVP to a range of visitor types, and will continue to refine and update our showcasing and demonstration systems.