

## **REFLECTIONS AFTER EIGHT YEARS OF APPLIED DESIGN RESEARCH**

Industrial design research on truck transportation carried out at the Umeå Institute of Design at Umeå University in collaboration with the Volvo Group

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The research programme Safe Effective Transport (SET) was jointly initiated in 1997 between the Umeå Institute of Design at Umeå University and the Volvo Group. The purpose of the SET programme is to study various issues concerning truck transportation and the truck operators working environment, from a multi-disciplinary point of view, with an emphasis on analytical and creative industrial design methodology. The programme has since inception been sponsored by the Volvo Group, and continues today in close collaboration with 3P in Gothenburg. 3P (which stands for product planning, product development and product design) have been the organisation responsible for the product development of trucks for the Volvo Group since the purchase of the Renault/Mack Group. The research collaboration between the Umeå Institute of Design and 3P was extended for the fourth time in January of this year and is planned to run until the end of 2007.

Over the years the SET collaboration has resulted in the completion of more than 40 different project activities. These have been equally divided between applied research and student course and degree projects. 30 of them have been published as reports, either in a written format, or on CD-Rom due to the increasing use of digital media. As a natural consequence of this, and the fact that the Volvo Group is an organisation with world wide product development, the SET website was launched two years ago, providing a “project bank” of information and downloadable files for each completed project.<sup>1</sup> All results and publications are made available for the exclusive use of the Volvo Group, and any divergence from this would require the approval of the SET steering group. This paper describes some of the conclusions that can be drawn from the development of this research programme, the first at the Umeå Institute of Design, after more than eight years’ experience of applied industrial design research in co-operation with an international industrial partner and sponsor.

In order to gain an understanding of the research done within SET it is necessary to briefly mention the background of the Institute, the educations, the research group and the philosophy that unites them. Since its foundation in 1989 the Umeå Institute of Design has developed important collaborations and has engaged in continuous dialogue with local, national and international industrial production companies.<sup>2</sup> This ensures that the Institute offers a highly relevant, competitive and professional design education. A prominent characteristic of the Institute is the regular inclusion across all of the Institute’s four programmes, of course and degree projects that are collaborations with sponsoring companies.<sup>3</sup>

Over the last decade the Institute has offered a Bachelor degree and three alternative Masters degrees in industrial design to its students. The BA level, which is taught in Swedish, provides students with a general education in the field and methods of industrial design. The MA level includes three different programmes focusing on Advanced Product Design, Interaction Design and Transportation Design. The studies and lectures for the Master programmes are provided in

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<sup>1</sup> To see the unrestricted section of the SET website go to <http://www.dh.umu.se/SET>.

<sup>2</sup> For more information go to <http://www.dh.umu.se>.

<sup>3</sup> For more information see Thomas Dickson, *Designforskning - en international oversigt*, Århus, 2002, pp 159-160.

English, and both Swedish and foreign students apply for these courses on equal terms. This has created a multi-cultural study environment at the Institute, where approximately 50% of the MA students are from overseas. This mixture of nationalities, work methods, experience and attitudes towards industrial design has become an important contributor to the creative synergy within the Institute. The diversity and "melting pot effect" is seen as a beneficial factor for the students and their studies, for internationalisation of the Institute, and as an attractive resource for the partners and sponsors chosen by the Institute for project collaborations.

A further source of creative synergy is gained by combining project activities and competences from the Institute's research group with its educational programmes. The parallel and traditional mode of doing this is by involving all employed researchers in the education activities, either as project tutors or as teachers in specific training courses.

Additional to this parallel approach, there are two other methods of combining research and education which are frequently used at the Institute. The first is the interleaved method. This is achieved by involving a class of students with a defined theme from one of the on-going research projects. In this case the responsible researcher doubles as project tutor, ensuring that experiences and ideas are shared and developed, accommodating the differences which exist between education and research, in degrees of complexity, constraints and time perspectives. When combined appropriately, these differences unavoidably enhance the creativity of each sector, and the outcome of both activities.

The second method is to combine the two activities subsequently. An example of this was when the conclusions from an intense three-day "stand alone" research workshop with a company active within the area of vehicle safety, served as the theme for a 10 week course project for a class of students on the BA programme. Combinations such as these enable a cross fertilisation of ideas, knowledge and modes of creative expression. It also ensures that both students and researchers are regularly updated on the required level of tools, skills and professionalism expected by the industry, which today is constantly being developed and refined. A further factor that should not be overlooked is that students gain "professional experience" and are provided with opportunities for creating contacts that can be useful during their degree work or after graduation.

When the SET programme was initiated, it was the first research activity at the Institute to be fully collaborative with an industrial partner. Today around 10 persons work in the Institute's research group, currently involved in projects and programmes with companies and partners such as the Volvo Group, ABB and the Umeå Town. The philosophy of the research group has traditionally been dominated by an empirical and practical approach, achieving user driven design through the use of applied research.<sup>4</sup> The group was officially founded five years ago with an emphasis on interaction design, including computer technicians and programmers in addition to the industrial designers. Over time and through various types of projects and creative challenges, the group has developed a wide range of expertise and knowledge within industrial design, and particularly within the three areas of product, interaction and transportation design, which are represented on the Institute's MA level courses. These three design competences reflect the diversity in design knowledge required by industrial designers, to fully explore the theme of user driven design within the multi-layered and complex research field of trucks, and of international truck transportation generally. As well as being an ever more integrated and important part of our

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<sup>4</sup> For more information see Thomas Dickson, *Designforskning - en international oversigt*, Århus, 2002, pp 159-160.

industrialised society, the field of truck transportation is also becoming increasingly complex and technologically advanced, along with the rest of our society. At the same time, the truck and its working environment has undergone very little change, mainly due to legislation, present engine technology and tradition. The main objective of the research programme Safe Effective Transport is to improve the working environment inside, outside and around the vehicle, from the perspective of the vehicle operator, through the research, analysis, ideation and visualisation techniques of industrial design.

The method most frequently used within SET for identifying problems and potential areas for improvement consists of participatory observation. During and after the encounter with a defined user group, the behavioural patterns of the users, both conscious and unconscious, plus their context are documented textually and visually. After summarising and analysing these issues, specific needs and wishes are identified in association with general and specific characteristics of the users as a group and as individuals. This qualitative method of user study provides a wide range of information, impressions and inspiration, plus something further that is indispensable to the industrial designer - empathy. Together these form an irreplaceable foundation for the creative phase that follows. The ideation methods and techniques used for generating, conceptualising and visualising ideas are determined by the project objective, the allocated time and resources and the professional expertise of the assigned researcher. If the development of physical products or concepts is defined as a part of the project, which is frequently the case, these are constructed, then tested and evaluated by the previously interviewed group of users under the supervision of the researcher.

Five main focus areas (and recently a sixth potential one) have been organically defined, developed and explored during the preceding eight years. The first theme to be studied was how varied types of cargo are transported and handled, and the effect of this on the work environment and work pattern of vehicle operators. The main objective of projects undertaken within this theme was to improve the physical ergonomics in connection with loading and unloading the vehicle.<sup>5</sup>

The second topic of study involved issues related to truck transportation and society. One main area of study has been the occupation of truck driving as seen from a gender perspective. The other concerns the expectations, attitudes and experiences of the truck driver occupation, as seen through the eyes of three different groups: the potential, the “soon-to be” and the “early experienced”. Studies like these are assigned to researchers from other institutions at Umeå University to gain additional input from their specialities of ethnology and/or psychology.<sup>6</sup>

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<sup>5</sup> See the following publications by Tapio Alakörkkö: *Lotsens arbete*, Umeå University, 1999 and *Buller vid godshantering*, Umeå University, 2000. See also Stina Juhlin and Tapio Alakörkkö, *Klimatkänsliga transporter*, Umeå University, 2001. This paper only refers to the publications of research projects and not projects related to student course or degree projects.

<sup>6</sup> For more information see Eddy Nehls, *Lastbil som livsstil*, Umeå University, 1999. See also *Vägval: lastbilsförare i fjärrtrafik-perspektiv på yrkeskultur och genus*, Göteborg, 2003 (Skrifter från Etnologiska föreningen i Vestsverige 41). A report about the attitudes and experiences in connection with the occupation as a truck driver will soon be published by Katarina Haugen, Jörgen Garvill, Kerstin Westin, *Framtidens lastbilschaufförer – en förstudie*, Umeå University.

Two years after the start of the programme a third theme was included, which involved an exploration of the potential for the development of products or services designed to assist the operator in performing both specific and general work related tasks.<sup>7</sup>

The first two projects (a student project, followed by a longer research project the year after) both focused on mobile and wearable devices to be used and worn outside the vehicle for communication and logistic administration. This led to a series of projects concerning the handling of communication and information, where the dominant design competence used is interaction design. In recent years the projects within this theme have included more traditional product design, with the goal of creating or improving the tools and equipment used for everyday tasks, both inside and outside the vehicle.

1999 was the first year in which the focus was directed towards the design and functionality of the truck exterior. Design studies on this theme are today carried out on a regular basis, as both course and degree projects on the Institute's Master programme of Transportation Design. One year later the fourth research theme was further explored, with three researchers assigned for twelve months to investigate the use and functionality of the truck interior for the first time. The restrictions on this occasion were that the driver's environment and the human in-vehicle interaction were not included in the project or the programme's research scope.<sup>8</sup> When this was added the following year, a fifth research theme was created. Since then there have continuously been research activities within this theme, which is a tendency that is expected to continue.<sup>9</sup>

The latest area to be explored as a part of the SET research relates directly to industry and market research (IMR) carried out at the product planning departments within 3P. IMR is in its purest form associated more with planning than design, but it is nevertheless an essential step in the conceptualisation and realisation of a vehicle. In this particular project the academic research resources within SET were chosen in preference to the traditional solution of hiring the service from a consultancy.<sup>10</sup>

This expansive development of the research themes can in retrospect be seen as the result of a process of maturation of three coherent components. Firstly the development of the SET programme in regards to building knowledge about applied research and how this is applicable to the theme of truck transportation. Secondly the proven value of the research results delivered, as creative contributions to the product development process within 3P. Thirdly, the on-going refinement of the administrative collaboration with 3P, with an increasing confidence between the partners, in the work and results jointly undertaken. What may initially have been a certain level of scepticism as to the worth and potential of applied design research from an external partner has been transformed into a high level of trust from 3P, which consequently has provided SET with confidential insights into project activities inside the 3P organisation.

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<sup>7</sup> Niklas Andersson, Lars Johansson, *Communication Tools for Truck Operators*, Umeå University, 2001. Thomas Degn, *Truck Drivers Multi-Function Bag*, Umeå University, 2005.

<sup>8</sup> Thomas Degn, *Smart & Functional Cab Interior*, Umeå University, 2003. Mikael Thelin, *Smart & Functional Cab Interior 2*, Umeå University, 2004. Demian Horst, *Cab Front & Instep Adopted to Segments*, Umeå University, 2005.

<sup>9</sup> Lars Johansson have made the following publications *Input and Output Modalities / Multi-Functional Devises*, Umeå University, 2005. Soon to be published *Controls for Build-on Functions*, Umeå University, 2005.

<sup>10</sup> An IMR study made and soon to be concluded by Thomas Degn, *Low Cost / High Functionality*, Umeå University.

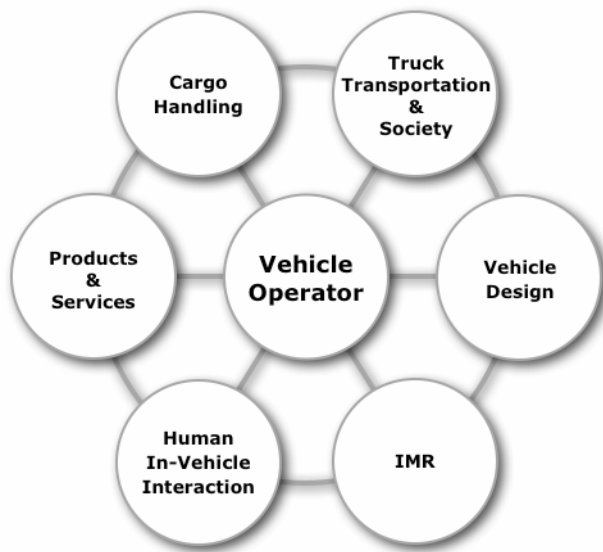


FIGURE 1: The developed cluster of SET research areas

A number of general conclusions can be derived from the past eight years of exploration and development on the first applied research programme at the Umeå Institute of Design. The two mentioned in this paper are believed to be generically applicable to other creative collaborations between academic and commercial partners.

The main conclusion is in regard to the potential use of industrial design methodology within the planning and development departments at 3P, particularly in the process and visualisation methods, as used in the research, analysis and conclusion phases, which have potential as creative communication tools in the planning and development process, an area traditionally dominated by engineers. These creative qualities can be particularly beneficial in connection with products which have a high degree of complexity, user interaction and comprehension. The development process today often takes place on an international level between parties of varied backgrounds, competences and convictions. The ability to demonstrate the process, the identified problems, and opportunities or facts through a combination of logic, summarisation and visualisation, are appreciated in an organisation where information must be transferred, absorbed and understood internationally. At the request of the 3P representatives in the SET steering group, the introduction of industrial design methods and skills to the 3P organisation has become an on-going research activity within the SET programme.

The second conclusion is that industrial design research can be used with advantage as an innovative “facilitator” by the university, to achieve true multi-disciplinary collaboration between competences at the academic institution and with one or more commercial sponsors.

Both the differences and similarities that exist between the partners have the potential, when combined appropriately, to enhance not only the knowledge and insights of the specialisation and organisation of the collaborating partner, but also of ones own.

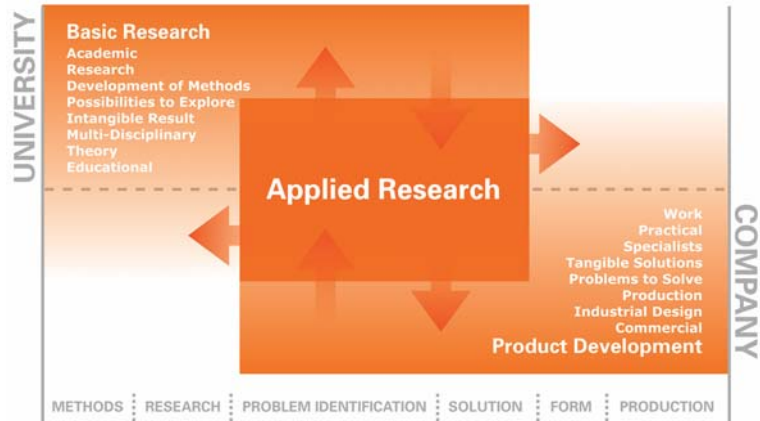


FIGURE 2: The potential of using applied research as a platform for joint development

Industrial designers frequently develop the capacity to embrace the role of project leader, responsible for combining collaboratively produced knowledge with his or her creative skills. Universities could use this quality, both internally and externally, on a larger scale than occurs today. As well as ensuring creative results, multi-disciplinary research in user driven-design could be used to develop the competences of participants and the contact between them, strengthening the profile of universities in the commercial sector, and functioning dynamically in the constant striving towards a more developed, competitive, and at the same time a more humane society.