Design beyond technology: rethinking our automotive futures

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Good morning - it is great to be here with you all this morning, and I'm very much looking forward to being a part of what unfolds today.

 In a round-about way, I came to be talking to you today via a background in mechanical engineering. My focus has expanded more recently from technical design to fundamental considerations about why we carry out engineering activities in the way that we do, and that has brought me into the sustainability field.

Today I'm going to be moving right away from the more familiar realm of technology and engineering. I must admit that I still find this is an uncomfortable position to take and I expect that for many of you, we will be moving outside your comfort zone too. Even so, I believe that this uncomfortable journey is an important one for us to take.

I'll be as direct as possible here. My purpose today is to take this wonderful opportunity to challenge all of you, as representatives of the automotive industry, to fully embrace responsibility for your leadership role in the quest for sustainable futures.

I aim to be provocative, to bring into question the current stories that we tell each other about why and how we design cars. My central contention is that rewriting the stories that we tell about how our world works will play a pivotal role in creating sustainable futures.

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Just a quick outline of how I came to be speaking here today and where I would like us to travel over the next twenty minutes.

Last year, I was part of a team that carried out a study for EPA Victoria looking at alternative road transport fuels and technologies into the future as part of one of the Victorian Greenhouse Strategy action modules.

Our report will be published online shortly, so rather than preempting this by discussing specific outcomes, I'll look very briefly at the approach that was taken to the study.

I'll then move on to look at the deeper insights that emerged for us, namely those relating to the critical importance of our shared stories about the world in navigating towards sustainable automotive futures.

Finally, I'll take a look at how these insights are playing out in the present, and how they might impact on automotive design into the future.

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So first, to the study itself and our broad methodology. The National Centre for Sustainability at Swinburne University was the lead agent for the work, supported by outside expertise from CSIRO Environmental Risk Network and RMIT Centre for Design. This was very much a trans-disciplinary, multi-perspectival study.

The first stage involved research into the full range of current and emerging road transport technology and fuel combinations under consideration globally. The outlooks for these options were investigated across an extremely broad range of Social, Technical, Economic, Environmental and Political variables, otherwise known by the acronym STEEP variables.

The study looks at the situation in Victoria out to 2015. And while this is the focus, we recognised the need to consider this in relation to the national and international technology and fuel contexts, and longer time horizons.

One of the key points of difference for this work was the need to devise a suitable assessment framework to assess the relative merits of all options across the full breadth of STEEP variables, bearing in mind that these included both qualitative and quantitative elements. Of course, all quantitative measures ultimately have a qualitative base - and keep in mind that it's not every day you'll hear that from a professional engineer.

A key output from the work was a range of policy options that the Victorian Government might consider for promoting alternative fuels and vehicle technologies to reduce greenhouse gas emissions for a range of future scenarios.

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The diagram behind me provides some "strategic context" for the study. It depicts the total strategy process that is in use at the Australian Foresight Institute at Swinburne University. That perspective takes what is perhaps the more familiar process of policy development feeding into policy implementation and adds a meta-stage of "Strategic Thinking".

One of the primary elements of the "Strategic Thinking" stage is the foresight process, an approach that opens up the long term future to deeper analysis and interpretation, and methodically investigates the question: "What might happen?"

The study was intended to form the foresight input stream into the Victorian Government's Strategic Thinking on greenhouse gas reduction from road transport.

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The scenario process is where the really interesting stuff happened for us. A scenario exercise involves the methodical creation of "worlds" based on possible stories about a future context of interest: in our case, that of future automotive design.

The purpose of any scenario exercise is to expand the boundaries of our thinking beyond business-as-usual. This is specifically NOT about prediction, but is instead about freeing us from assumed constraints.

The approach that we took is based on the rigorous selection of two high impact and high uncertainty drivers of change that could plausibly come into play within the nominated time horizon. These drivers are variables, each with a high state and a low state, with the low state corresponding to today's status quo.

By setting the states of each driver, the logic that applies to each scenario "world" is determined.

For the purpose of the study, the story that played out in each scenario "world" was focussed on structural conditions and was described in terms of the STEEP variables that formed the basis of our research.

The ultimate aim of the scenario exercise is to make each of the "worlds" work for us, by determining an appropriate mix of fuel and technology options that can contribute to reduced greenhouse gas emissions and by proposing policy options that would promote this.

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I'll take a quick look at the drivers that we selected.

The first driver was described as the degree of "environmental concern" within the wider community, represented here by business attitudes in the rich world on one hand, and the immediate experience of changing environment in the poor world on the other.

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And the second driver that we selected was the potential onset of a peak in global supply of crude oil leading to extreme oil price variability and loss of confidence in regulation by market forces.

Throughout the course of the study we came to appreciate that rather than seeing these drivers as directly causing change, it is more valuable to consider the relationship between exterior conditions "out there" and our individual and social stories that we live by "in here", in our own minds and in our shared culture.

We can then look at how shifts in these stories, over longer periods of time, lead to changed contexts for activities related to the automotive system such as determining policy or designing vehicles.

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For us, it wasn't just "climate change" that was of interest: it was transformations in environmental awareness related to changes in climate.

Likewise with the spectre of a peak in world oil supply, we were interested more in the impact on shared values in a world where something we have come to take for granted – relatively stable transport fuel costs – shifts beneath our feet.

And within this expanded context, the limitations of design changes based solely on technical interventions became very clear. Again and again, in our backroom discussions, the question was raised:

OK, but what is the *social* story within which any *technical* solutions are put forward? It is within this realm of shared stories that change can either:
occur very rapidly or
be derailed entirely due to our inability to value technical benefits.

So, from our perspective, this is where the deeply significant change must take place – changes inside us and within our culture, changes in the stories that we tell about why we do what we do, and that affect the choices that we make in the present about the future.

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Our study was explicitly looking at a ten year time frame, what we might call a mid-term time horizon.

If we are interested in even longer-term perspectives on automotive design, it becomes important to look not just at the physical and cultural environment for which we are designing, but also at deep historical perspectives on the ideas that our designs are based on. These historical perspectives are simply our shared stories about the past, and they play a role in shaping the possibilities that we can see.

A valuable insight that emerged for us from the study was the need to avoid the restrictions imposed by conventional design categories, categories created by holding an historical perspective that is too short to see the deeper change processes taking place.

The problem with fixed categories is that they tend to channel us into seeing solutions in a particular way, constraining the field of possibilities.

I use the example here of automotive design focussed on the idea of "The Car", perhaps locking us in a little too closely to a narrow idea of "The Future".

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And to open up our thinking, I'll propose a shift in our category of analysis from "The Car" to "personal mobility", as an important step in re-imagining the stories that underpin automotive design.

The significance of this is illustrated in the image on the screen, where by situating the car as just one, recent approach to the idea of personal mobility, a wide landscape of longer term futures opens up. The particular form that "personal mobility systems" take may well need to be open to change if we are to move successfully towards sustainable futures.

This type of perspective encourages us to look not just at "the car", but at the much wider systems within which the car is conceived of, created and used. In bringing about healthy, sustainable change in personal mobility, we need to be designing not just a technological solution, but looking at the deeper stories about the role of the automobile in our lives.

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The key idea I'm getting at, is that if we are to make our personal mobility systems truly sustainable, we need to encourage the development of deeper, whole-of-system perspectives.

This isn't just about taking conventional design and manufacturing practices and embedding them within an industrial ecology framework, for example by applying methodologies such as Life Cycle Analysis (although this is clearly very important).

It is about recognising that there are foundational CULTURAL drivers that underpin the role of the STEEP variables in influencing automotive change.

Implementing truly sustainable personal mobility systems requires that we recognise that anything and everything we do is based on incomplete and imperfect stories about our world. The changes we need require acceptance that our stories *are* in fact stories, and involve the taking of responsibility for rewriting these stories to suit changed understandings of the world.

We need the courage to ask questions such as:
What is a car?
What is its purpose?
What does it mean for us?

I would ask you to just keep these questions turning over in the back of your mind as we move forward over the next few minutes.

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I'll now take quick look at where the local automotive industry appears to be today, at least from the perspective of an industry outsider. I'll outline the story as I see it using a couple of particular examples.

The first example is hard to go past for a propoent of sustainable futures. Holden's internationally groundbreaking hybrid ECOcommodore prototype hit the headlines around 2000. And I think that for many observers at the time, this hinted at fresh

imagination entering the Australian automotive story. There was a real sense of anticipation about where Holden might be headed.

Elsewhere at Holden, another story was being told: this time about the new V8 Monaro. To some observers, the engineers seemed to have learnt this story by wrote, based on a tradition handed down from a past generation. The Monaro story set us on a path that seemed to head in exactly the opposite direction to the ECOcommodore story.

So which story prevails today?

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Well I'm sure most of you here today know the answer to that. Almost forty years ago, automotive design in Australia was based on a mechanistic story of raw power and cut-throat competition between Ford's Falcon GT and Holden's Monaro…

…and today, almost forty years on, it seems that the old story continues.

Perhaps those of us who are excited by the emergent potential for human ingenuity might be forgiven for seeing this present story as a failure of imagination, a displacement of new market leadership by old market appeal, and a forced perpetuation of outdated, mechanistic thinking.

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Can we see this old mechanistic story being replaced elsewhere by an emerging ecological story? There are certainly indications that this is happening.

For example, digging down into the Toyota website, I found the following quote:

"World president Harry Okuda has made harmony with the global environment the priority for Toyota activities. His view is that unless manufacturers act decisively the automobile may *cease to be a viable transportation option*."

While from my perspective, it would be great to see a quote like this prominently displayed centre top on Toyota's home page, this does seem to signal a significant shift.

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And so while the old story was this one of raw power and cut-throat competition, today there are encouraging signs of a new story of cooperation towards sustainable futures.

Of course, this is not a one-person show, there are certainly others showing signs of re-imagining new foundational stories also, and for some this extends from particular vehicle concepts to the whole system of design and manufacture.

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I'll move on now to look at some examples where renewed cultural stories are shaping the context for design of personal mobility systems.

These examples highlight the role of an informed and aware public in influencing outcomes towards environmental and social sustainability. A key question for the automotive industry is: can it align its own foundational stories with those of an informed and aware public, and if so, how?

The focus here is on expanding our approach to design issues from the strictly technical to include the way that we use the car, to see the "hardware" of the vehicle itself existing in relationship with the "software" of social contexts.

In much the same way that the purpose of physical computer hardware can be changed by rewriting its software, so too can the nature of a car be modified by rewriting its social software, by changing the stories about how we live with cars, and how we interact with each other in the social spaces otherwise known as "roads". And for healthy change to occur, the hardware needs to be designed to integrate harmoniously with this social software

First I'll look at examples relating to "vehicle efficiency", and then move on to examples relating to "vehicle safety".

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When I say "efficiency", I'm not thinking about the engineer's thermodynamic definition. For "efficiency" to have any real meaning, it needs to be related back to a clear definition of the vehicle's purpose.

While I realise that for some marketing people this may be controversial, consider that the purpose of a vehicle is to move people from A to B quickly and conveniently.
The easiest way to improve efficiency is then to carry additional passengers in existing vehicles, rather than changing thetechnology of the vehicle itself.

Of course, the "ease" of this is dependent on the social story that underpins our use of the vehicle. And there is great scope for designers to intervene here through information and communications technology, facilitating new ways of thinking about how we use vehicles. Consider concepts of shared use, or re-imagining the vehicle's interior as a social space.

And on the subject of shared use, with the advent of car-share schemes in Australian cities, we're seeing the idea of efficiency extended to the entire vehicle life-cycle by optimising the amount of hardware per person-kilometre.
Again, these schemes are based on rewriting the social story about our relationship with cars. Perhaps in car-sharing, we can see a "weak signal" pointing to deeper shifts in society's narrative.

Finally, concepts such as car-sharing introduce an opportunity for manufacturers to think about providing the utility of a vehicle, rather than the vehicle itself, looking beyond cradle-to-grave efficiency to cradle-to-cradle efficiency.

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Let's move on now to look at the issue of "vehicle safety" from our deeper perspective.

In the past, vehicle safety has focused on either passive protection of occupants, or on technology to improve active safety by avoiding collisions. And as is now recognised more widely the effectiveness of safety measures based on the design of individual vehicles is ultimately limited in two ways:

The first is the effect of vehicle design on the safety of other road users and pedestrians.

The second is related to the notion of "active" safety, where this is dependent on the behaviour of the driver, rather than on technology.

While it is possible to frame the first of these considerations as a design issue, for example by looking at the effect of 4WD geometry on crash-compatibility, what is at least equally significant here is the way that we, as vehicle purchasers and drivers see both our own vehicles and our relationships with other road users.

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In August last year, an article titled:
"Padded cars offer crunch-free future"
appeared in The Age newspaper.

The article describes a project at Massachusetts Institute of Technology to design a vehicle that would leave pedestrians unharmed in a collision, and that would allow vehicles to be driven in congested traffic with bumpers touching. What we see here is a "weak signal" of a very different social perspective on the nature of cars and roads, and in particular on the notion of road safety.

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We're starting to see greater concern for these issues, as indicated by the idea of "padded cars", or perhaps a little more subtly in the Royal Automobile Club of Victoria's Used Car Safety Ratings, where vehicles are rated both for how well they protect occupants, and how badly they hurt occupants of other vehicles.

There are indications here that we are seeing values relating to the way that we travel as open to examination and renewal. This is reflected by the debate over the appropriateness of 4WDs in urban areas: while growth in sales of 4WDs continues to expand rapidly, there is concurrent growth in the questioning of the right of individuals to drive vehicles that increase risk to other road users.

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Looking at just one example, the Australian Financial Review published the essay "Big and Bad" by Malcolm Gladwell in April last year. The essay looked specifically at the issue of the driver's role in active safety.

Gladwell observes that "feeling safe has become more important than actually being safe" and that "The SUV boom represents…a shift in how we conceive of safety". He highlights the critically important role of socially-grounded interpretation in the issue of road safety, and considers the importance of the driver's sense of vulnerability in shaping driving behaviour.

By focussing on a technology-based approach to vehicle safety, we insulate drivers from this sense of vulnerability, from the sense that all road users are ultimately dependent on each other for their safety. Within this shared sense of vulnerability we find an opportunity to see the entire notion of "safety" differently, and hence to find new approaches to address the idea of protection.

This idea is beautifully illustrated by a cartoon that appeared in The Ecologist way back in 1989. The top image is a metaphor for the conventional approach to safety, based on making the driver "invulnerable". And below this, we see an alternative approach to safety, where the driver is made aware that his safety is tied to the safety of others.

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This idea is not so new. Here is a great example of a vehicle based on a very different story about efficiency and safety, the Citroen Deux Chevaux, a vehicle that remained in production from 1948 to 1990, because its foundational story remained relevant to the culture within and for which it was designed and manufactured.

Here is a quote that sums up the virtues of this very odd little car:
"Perhaps the safest car in the world is the 60-year-old, 4 litre/100km Citroen 2CV... It occupies insurance categories with premiums below those of other cars because it is driven carefully. Its drivers know their vulnerability and drive accordingly, in spite of the engineering."

While I am not advocating that we turn back the clock and all drive Citroen Deux Chevaux, the success of this car, both for its manufacturer and for the society for which it was designed, demonstrates that there are excellent precedents for vehicles based on stories aligned with the social needs and environmental constraints of their particular time and place.

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So what will our relationship be with the cultural shifts occurring around us? Will we simply respond to whatever arises or will we be active agents for change?

 In closing, I would ask you to think again about how you would answer the questions posed during the presentation:

What is the purpose of the car? What does it mean to me? I suspect that for many people here, the answer revolved around notions of freedom, either in terms of personal mobility, or perhaps in terms of the freedom provided by the economic activity of a successful automotive manufacturing industry.

And what I will suggest is that this freedom entails a commensurate responsibility; that the individual benefits that we obtain from our automotive system exist only in relationship with wider communal structures. And I think that one of the most important responsibilities that we have is to play an active role in changing the stories that we tell ourselves and each other to ensure that this relationship unfolds in a healthy and mutually beneficial way as we move forward to the future.