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## Looking back to move forward: the Dymaxion revisited

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### Abstract

In 1933 and 1934 the visionary architect, designer, engineer and philosopher Robert Buckminster Fuller built three prototypes of a car he named the Dymaxion. Regarded as a ground breaking concept vehicle, the Dymaxion is arguably more relevant today than when it was conceived over eighty years ago. Although plans to manufacture were abandoned by Chrysler in 1933, the Dymaxion Car was considered the most fuel-efficient car of its time using less than half the amount of gasoline than any other car on the road. This was due to its meticulous design based on scientific first principles, power weight ratios and the laws of aerodynamics. The Dymaxion was spacious and easy to maneuver; it offered multi purpose use options with the passenger capacity of a modern people carrier and represented Buckminster Fuller's social responsibility mantra to create more with less. The brand narrative of the Dymaxion tells a story of sustainability and practicality that resonates with today's vehicle consumer market. The adage suggesting that there is reason why a car's windshield is bigger than its rear view mirror and implies that what lies ahead is much more important than anything behind you. Although this life metaphor acknowledges the importance of an occasional glance back this paper emphasises the strategic value of a precognitive, retrospective approach to design.

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*Keywords:* design; innovation; precognitive; retrospective; narrative

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### 1. Introduction

This paper asserts that brand and product are inseparable and should be considered as one in design and development discourse. This proposition is presented within the context of a case study that asks, could Buckminster Fuller's Dymaxion car (fig.1, 2). be a viable proposition now? Is it worth revisiting and would a project conceived

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over eighty years ago benefit from contemporary knowledge, advanced technologies and alternative creative strategies? This retrospective enquiry investigates a precognitive hypothetical in the context of a brand/story built on narrative of technology, innovation and futuristic ideals. This paper reviews the Dymaxion case study in the context of branding and communication and within the frames of innovation theories. It also highlights recent research by the General Motors Company, which could stimulate new thinking about the Dymaxion and its supposed viability if produced today, over eight decades after it was conceived. Alternative energy systems combined with advanced materials (nanoscale fibers, carbon composites) and technologies (engines, drive trains, stability, electronics) are considered within a framework of innovation and conceptual reincarnation. This paper identifies Buckminster Fuller's Dymaxion as an overlooked case study worthy of reconsideration. It argues that designs including the Dymaxion may have been unfairly judged when introduced, questioning their perceived failure and presenting the argument that they may have simply been ahead of their time. This paper adopts a "design thinking" viewpoint to explore brand narrative (product and creator as brand) and diffusion of innovation theory to determine the value of resurrecting a concept that was conceived over eight decades ago; in effect, looking back to move forward.

## Nomenclature

A	<b>Dymaxion:</b> a term used by Buckminster Fuller to brand several of his inventions, a portmanteau of the words dynamic, maximum, and tension.
B	<b>Nanoscale fibers:</b> also known as nanofibers are strands of material less than two hundred nanometers in diameter.
C	<b>Carbon composite/carbon fiber:</b> Carbon and/or carbon fibers are combined with other materials to form a composite reinforced polymer.
D	<b>Diffusion Of Innovation (DOI):</b> Diffusion of Innovations is a theory that seeks to explain how, why, and at what rate new ideas and technology spread through cultures, E.M. Rogers (1962). <b>Drive train:</b> a group of components on a vehicle (excluding the engine) that deliver power to the driving wheels.
E	<b>GM EN-V:</b> General Motors Electric Networked -Vehicle
F	<b>Brand:</b> A brand is a name, term, design or other feature that distinguishes products and entities. A brand represents the values, history and the future focus of a business and/or product.



Fig. 1. Dymaxion No1. at the Chrysler Pavilion, 1934 Chicago World's Fair (source: Estate of R. Buckminster Fuller).

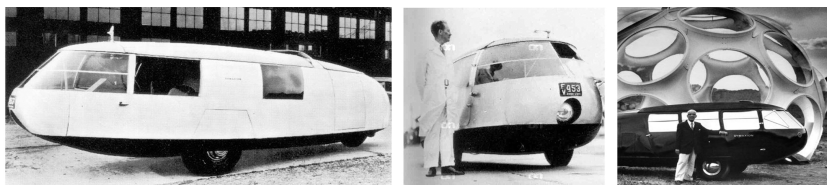


Fig. 2. Buckminster Fuller's Dymaxion cars (source: Estate of R. Buckminster Fuller)

## 2. Theoretical Context

The Dymaxion car project is often referred to as an iconic example of innovative, experimental industrial design and engineering. It is rarely if ever discussed in the context of communication design and branding. There are many interpretations and definitions of 'brand'. de Chernatony and Dall'Olmo Riley (1998) describe brand as a multidimensional construct matching a firm's functional and emotional values with the performance and psychosocial needs of consumers. Within his construct Diffusion Of Innovation (DOI) theory (est.1962), E.M. Rogers (1995) argues that communication is a process in which participants create and share information with one another to reach a mutual understanding. Innovation is defined as, an idea, practice, or object that is perceived to be new by an individual or other unit of adoption (Rogers, 1995). This paper proposes that innovation and communication run in parallel and that arguably all 'design' is communication design. Every design is created from a story however communicating narrative relies heavily on the knowledge, perceptions and the interpretation of receivers and stakeholders. DOI aims to explain how, over time, an idea or product gains momentum, diffuses or spreads through specific populations or social systems. The end result of this diffusion is that people, as part of a social system, adopt a new idea, behavior, or product. Adoption means that a person does something differently than what they had previously (i.e., purchase or use a new product, acquire and perform a new behavior, etc.). The key to adoption is that the person must perceive the idea, behavior, or product as new or innovative. It is through this process that diffusion is possible (Rogers, 1995). When framed within the context of DOI one could argue that although conceived in 1933, the Dymaxion car could actually be viewed as a new idea if applied with contemporary technologies. In other words, the period of time passed while being over-looked has created the diffusion. In the third millennium the Dymaxion car would speak to a new audience, a global network of design literate, environmentally concerned stakeholders who may be more likely to embrace what had previously been put to one side. DOI seeks to explain how, why and at what rate new ideas and technology spread through cultures. The Dymaxion remains relevant due to its unique brand story involving a legendary creator and universal, utilitarian, cross cultural themes. It projects an optimistic narrative supported by a claim to be the world's first environmentally sustainable car, today it would be lauded as 'green' (Foster 2010). If 'branding' is the representation of the values, history and future focus of a business and/or product then the Dymaxion car can certainly be referred to as a brand. Even though the message from the creator(s) is firmly imbedded in the artifact, the story still has to be interpreted by the receiver. Rogers argues that compatibility influences adoption of an innovation; that is how consistent the innovation is with the values, experiences, and needs of the potential adopters (Rogers, 1995). Jerome Bruner also claims that the narrative mode of thought is based on the goals of understanding and the construction of meaning, "Narrative deals with the vicissitudes of human intention" (Bruner 1986, p.16). In this statement Bruner implies that consumers tend to use case studies in a self-relevant way, in a response to change or to reflect on experiences. Individuals interpret narratives to orient their future aspirations and past experiences in context of time and location. The distillation of the brand narrative reinforces values and aligns ideals but this will vary in individuals. Bruner suggests people use the narrative mode of thought to understand storied stimuli (1986). Information is indexed, stored, and retrieved in the form of stories and human memory is story-based (Schank1999). The Dymaxion is a story with many indices and touch points, potentially offering implicit and/or explicit awareness and emotional connections to users (consumers) and other stakeholders. Rogers argues that all projects reach a point of adoption or rejection however in some cases the rejection phase can have another step of "later adoption" (Rogers, 1995) as a result of discontinuance due to disenchantment with the first adaptation decision (Fig 3). One could justifiably conclude from Rogers's model (Fig.3) that "later adoption" might be a consideration given that the antecedents (receiver and social system variables) would have changed substantially since 1933. Diffusion of innovations theory suggests that innovation is not a sequential process. Adoption or rejection is a to-and-fro/trail-and-error process requiring the alignment of many factors. Dean Karman, inventor of the Segway PT makes the point that people take the longest possible paths, digress to numerous dead ends, and make all kinds of mistakes; then historians come along and write summaries of this messy, nonlinear process and make it appear like a simple, straight line (2005).

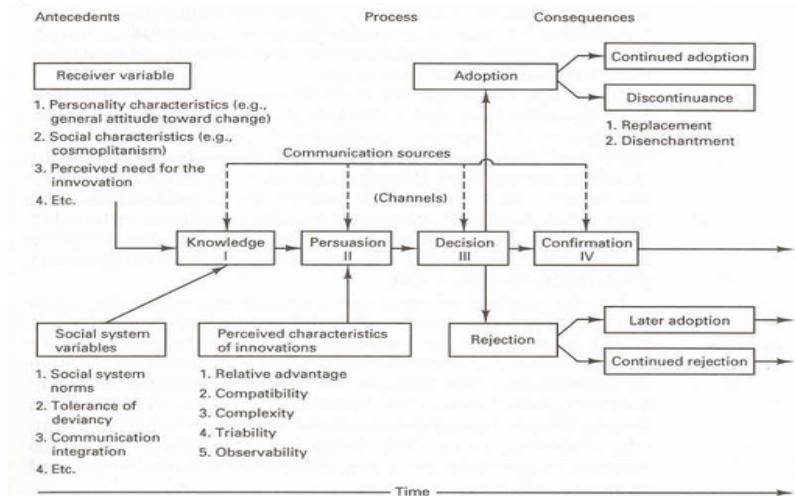


Fig. 3. Diffusion Of Innovation (DOI) model. (Source: Rogers 1995)

### 3. Innovation (Industrial design/engineering) to build Brand

Equations When automobiles first replaced horse-drawn carriages they were called horseless carriages. In 1886 German inventor Karl Benz refined the concept and built the Benz Patent-Motorwagen, regarded as the first modern car. Over one hundred and thirty years later motor vehicles remain fixed to the concept of a horseless carriage. On the other hand the Dymaxion (1933) was inspired by flight, particularly airships of the 1930's. The teardrop airship styling was unique and performed extremely well in wind tunnel testing. Although plans to manufacture were abandoned by Chrysler (fig.1) in 1934 the Dymaxion Car was considered the most efficient car of its time. British architect, Norman Foster in his book about the Dymaxion wrote that it had excellent power weight ratios and aerodynamics, was spacious, easy to manoeuvre and offered multi purpose use options with the passenger capacity of a modern people carrier (2011). The Dymaxion was unique because its inspiration came from a different source and a creator with a borderless, multidisciplinary, 'science meets design' mind set. Richard Buckminster Fuller (1895 –1983) was an American neo-futuristic architect, systems theorist, author, designer, and inventor. He was a lateral, design thinker, who influenced people's view of the world. Inquisitive by nature, his aptitude for innovation challenged conventional thinking by exploring what others overlooked or considered irrelevant. Buckminster Fuller was highly critical of the automotive industry and car design at the time. He believed all cars were highly inefficient with poor aerodynamics and fuel economy. He correctly claimed that, apart from the Dymaxion all cars at the time were shaped to perform better in a wind tunnel facing backwards rather than forwards. This observation remains true of most cars today. Although maligned by its critics Buckminster Fuller remained committed to the Dymaxion, which is arguably more relevant now than when it was conceived over eighty years ago.

Steve Jobs was someone who also had a unique vision with lofty aspirations. He championed an ambitious culture of innovation but importantly understood the value of connecting a product with its story. All Apple devices unite product and brand as one. Jobs, like Buckminster Fuller saw value in merging creation with creator within the brand. By objectifying the creator in this way expresses an abstract notion, feeling, or ideal of excellence and innovation. This approach packages the message in a form that has affinity and can be experienced and understood by others. Jobs used this approach when he featured Buckminster Fuller and other luminaries in a marketing campaign to help explain Apple's vision and philosophy. He did so as a considered marketing statement that positioned Apple's strategic mantra apart from the business practices of their competitors, which they implied were conservative and void of innovation. This was publically expressed in 1997 when Apple computers aired a one-minute television commercial called the Crazy Ones. It also used the TVC to announce its new marketing slogan, "Think Different" (Dormehl, 2012). The advertisement featured black-and-white footage of 17 iconic 20th century



personalities including Albert Einstein, Thomas Edison, Mahatma Gandhi, Frank Lloyd Wright, Pablo Picasso and Buckminster Fuller. Apple highlighted these people to support and reinforce the value of the “Think Different” mantra. They carefully selected individuals who had alternative viewpoints, which in their opinion enabled greatness for them but also for humanity.

“Here’s to the crazy ones. The misfits. The rebels. The troublemakers. The round pegs in the square holes. The ones who see things differently. They’re not fond of rules. And they have no respect for the status quo. You can quote them, disagree with them, glorify or vilify them. About the only thing you can’t do is ignore them. Because they change things. They push the human race forward. And while some may see them as the crazy ones, we see genius. Because the people who are crazy enough to think they can change the world, are the ones who do” (Siltanen & Clow (TBWA\Chiat\Day) 1997).

The underdog theme can be used to build brand equity. It offers an edgy appeal to those who are looking for alternative options. Avery (2010) introduced the concept of “brand biography” which provides theoretical and managerial insight for firms to author a dynamic narrative that can adjust to changing cultural and environmental conditions yet remain true to the legacy of the brand meaning that has already been established. “Using a particular type of brand biography, “the underdog,” we empirically show how managers can strategically use brand biographies in brand positioning”(Avery et al 2010.p, 213). The underdog brand biography mitigates the curse of success and anticorporate sentiment from consumers (Avery et al 2010). Buckminster Fuller was certainly one who saw things differently. He had a strong belief, supported by abundant self-confidence that he could change the world, which he did. His legacy continues today with his methods and formulas being rediscovered and used by contemporary architects and engineers. This renewed interest in Buckminster Fuller begs the question, could the Dymaxion be a viable proposition now, eight decades after its conception? Quoted in the December 1961 issue of *Popular Science* Buckminster Fuller said, “I just invent, then wait until man comes around to needing what I've invented” (1961. p.184). These prophetic words are supported by actions. In 2009 when Australian architects, Cox and Partners used Buckminster Fuller’s geodesic dome (fig.4), theories and formulas (est.1948) in the design and construction of Melbourne’s rectangular football stadium (fig.4). The inspiration becomes clear when one compares the Melbourne stadium with the Montreal Biosphère, which was built as the United States pavilion for the 1967 World Fair (Expo 67) (fig.4). Cox Rayner Architects with Arup also acknowledge Buckminster Fuller when describing their design for Brisbane’s Kurilpa Bridge (fig.4). The state that its conceptualisation, based upon Buckminster Fuller’s principles of tensegrity, was to simultaneously resolve unusual physical challenges, such as navigational constraints and motorway spanning. The design also aimed to embrace the spirit of a city relaxed, subtropical city seeking to prioritise walking, cycling and healthy lifestyles (ArchDaily, 2015). These contemporary Australian examples of inspired architecture remain true to Buckminster Fuller’s liveability imperatives and social responsibility mantra and by doing so reinforce the value in revisiting the Dymaxion. This ‘create more with less’ narrative also extends to the Dymaxion car, a story that may resonate with sections of today’s vehicle consumers as labelled by Rodgers - Innovators and/or Early Adopters (Rogers, 1995).

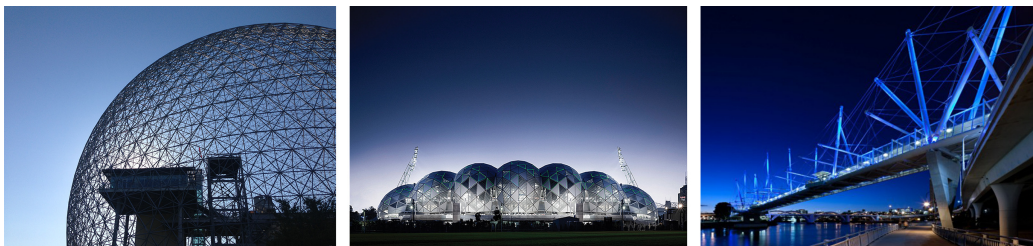


Fig. 4. (from left to right) The Montreal Biosphère, Montreal (source: Russell Kennedy). Melbourne Rectangular Stadium, Melbourne (source: Cox and Partners). Kurilpa Bridge, Brisbane (source: Christopher Frederick Jones).

#### 4. Technology to build brand

The EN-V or Electric Networked-Vehicle is a new two-seater concept vehicle that offers an autonomous mode that uses GPS and vehicle-to-vehicle communications as well as distance-sensors and cameras. This upright, two-wheeled electric vehicle has been developed by General Motors and its Chinese joint venture partner Shanghai Automotive Industry Corporation. The EN-V is 1.5 metres long, weighs 500kg and if recharged using 'green' energy is a zero-emissions vehicle. Three models of the EN-V have been produced; all reflect an assertive, design thinking development approach. GM's Holden design team in Australia designed the Xiao model EN-V. The multi-disciplined team created the EN-V concept over a fifteen-month period.

This work has really broken the mould of the projects we undertake within the Holden design studio. It has meant moving away from designing the traditional elements of a motor vehicle to develop new themes and technologies that might someday define the way we live our lives. Much of what we have learned during this project will help us in our ongoing efforts to meet the many transport challenges associated with a growing population (T, Stolfo 2010).

Although there are clear synergies in regard to spirit, aesthetics and environmental impact, the key knowledge benefit to the Dymaxion from the GM, EN-V would be its fixed wheel drive train configuration. The General Motors, Electric Networked-Vehicle uses Segway's gyroscopic drive train. This integrated engine, drive system positions the weight centrally and low to the ground under the driver, providing excellent stability and responsive turning. Although the Dymaxion did boast an extremely tight turning circle, stability and steering at high speed were seen as negatives in the original design. The Segway, GM EN-V drive train would potentially enhance the Dymaxion's steering and stability.

The Dymaxion was originally conceived as a multifunctional, high performance vehicle however this papers suggests that if revisited the expectations of passenger capacity and speed may need to be reviewed. The Dymaxion was a three-wheeled car with rear steering and front-wheel drive powered by an internal combustion engine. The car could transport up to 11 passengers, it ran 30 miles to the gallon and reached speeds of up to 90mph. The USA population demographic and society values have shifted greatly since the Dymaxion was conceived in 1933, with most people now living in the major cities of America. GM EN-V is very much an urban mobility vehicle so if this technology were to be applied the user profile of the Dymaxion would be reconsidered.

Technologies and attitudes have changed substantially since the Dymaxion car was conceived in 1933. This paper identifies current advancements that would potentially compliment a revised iteration. Wire and wireless controls systems offer potential benefits, as do advances in drive train technology, stability, and steering and lightweight nanofiber materials. Revised thinking involving new technologies could make the Dymaxion relevant enough to attract serious consideration of further research. This paper highlights General Motor's Electric Networked-Vehicle as a potential key to a revised the Dymaxion. The GM, EN-V could provide impetus required to resurrect a stalled idea.

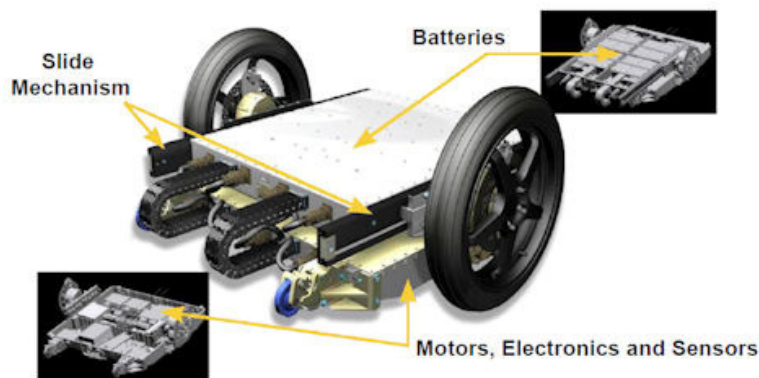


Fig. 5. Segway, GM EN-V drive train (source: General Motors Company).

## 5. Further Opportunities

Ideally the research would be funded through a combination of institutional grants and private sector support. Key stakeholders would be invited to participate including General Motors Holden (EN-V initiative), Deakin University Carbon Nexus research facility and the Buckminster Fuller Institute. It will be open an, inclusive, highly collaborative, multidisciplinary project, which builds on new and establish technologies and associated active research. A five step “design thinking” methodology will be used to; 1) articulate empathy, 2) define scope, 3) ideate themes, 4) prototype and build, 5) test and review (Stanford University, d-school 2013). The profile and demographic of consumers would also be identified using established DOI theory adopter categorization - Innovators, Early Adopters, Early Majority, Late Majority, Laggards (Rogers 1995).

This proposed research offers potential to explore the intersection of industrial design and branding. The project will examine the Dymaxion’s viability, review its strength and weaknesses and propose conceptual strategies and designs. The key aim of the research will be to determine the value in resurrecting a concept that was conceived over eight decades ago but with consideration of contemporary attitudes and new technologies. Developments in gyroscopic drive train technology would be looked at closely. The development of the EN-V forecasts a dramatic change in automotive engineering and the revision of design thinking processes.

The EN-V initiative certainly reflects Buckminster Fuller’s design philosophy of “doing more with less”. A technologically enhanced Dymaxion would also strengthen its brand and develop an inseparable bond between design, artifact and story. In feature-length documentary *Objectified*, Andrew Blauvelt, Design Curator Walker Art Center said, “There is a story embedded in every object. Every decision was made at some point about something...I’m reminded of a quote by Henry Ford who once said ‘Every object tells a story... if you know how to read it’” (as cited in *Objectified* 2009). It would insist on a seamless connection between product and consumer memory, experience and aspiration. To make this link, the research will need to confirm that society values and aesthetic sensibilities have shifted enough to embrace a revised Dymaxion car. Adopters and stakeholders need to be presented with a truthful narrative projecting a high level of intelligence, sincerity and principled aspirations.



Fig. 6. GM, EN-V Xiao and other model variations (source: General Motors Company).

## 6. Conclusion

This paper concludes that all design is communication design and that the broader construct of ‘brand’ extends to form. It also proposes a narrative driven, DOI focused research study to explore the benefits of a revised iteration of



the Dymaxion. Inspired by the Cox and Partners case studies (above), this project would revisit the Dymaxion car concept to determine potential viability based on a new vehicle with enduring brand equity built on a rich and inspiring historical narrative. The research would employ design thinking methodologies and participatory methods to explore and create design and communication narratives for strategic, on going development. By looking back to move forward this research will challenge accounts and truths within a context of time and circumstance. Dean Kamen is philosophical about time and place in regard to innovation and the acceptance of new ideas including his personal transporter. He claims that some truths do change more slowly than others and that if history is any indication, all truths will eventually turn out to be false (2005). Truths of physics change every few hundred years where as societal or technological truths change on a daily basis (Kamen, 2005). Further investigation will explore this point in relation to the Dymaxion to determine if now is the right time for a project of reinvention incorporating sustainability considerations, new technologies, discerning styling and futurist inspired design thinking.

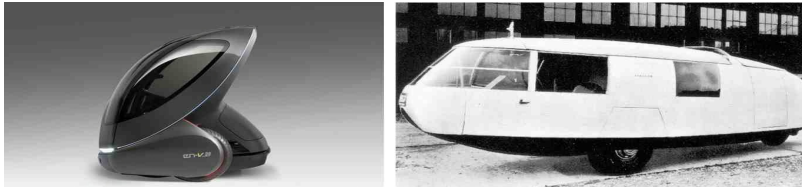


Fig. 7. Comparing the aesthetic sensibilities of GM, EN-V Xiao (source: General Motors Company) with Dymaxion No.1. (source: Estate of R. Buckminster Fuller)

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 Segway Inc.  
 The Buckminster Fuller Institute  
 The Estate of R. Buckminster Fuller

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