International Specialised Skills Institute

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MOTOR RACING TRAINING AND SAFETY

A Comparison: the USA Versus Australia

Bayden Clissold
Skills Victoria (TAFE)/ISS Institute Fellowship

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Executive Summary

This Fellowship enabled Bayden Clissold to undertake a fact finding tour to the United States of America (USA) to investigate the differences apparent within the motorsports industry of the USA and that of Australia, and to identify possible areas of improvement/development, particularly from a motorsports training perspective. The Fellow visited the following destinations:

Motorsport-Specific Trade Shows

International Motorsport Industry Show (IMIS) Trade Show, Orlando, 2009

This is a new motorsports trade show in its inaugural year, which came about largely due to increased demand and the lack of a suitable forum following the relocation of the Performance Racing Industry (PRI) Trade Show to Orlando.

Performance Racing Industry (PRI) Trade Show, North America, 2009

A trade show of mammoth proportions, the PRI Trade Show outgrew its original home in Indianapolis some six years ago and moved to the Orlando region, going from strength to strength every year. The Fellow found this was a good source of information on new and existing products and services.

The Motorsport Business Forum (MSBF), North America, 2009

This is a forum held in conjunction with the PRI trade show, also an inaugural event for the North American region. The MSBF was an excellent vehicle for the Fellow to network with other industry professionals and gather information on various aspects involving the motorsports industry, from sponsorship to race facility management, and all things in between.

The IMIS Safety Conference, 2009

This is a conference held in conjunction with the IMIS trade show that highlighted various aspects of safety in the motorsports industry with a medley of speakers during the day from many different organisations.

Motorsport Training Facilities

Indiana University-Purdue University Indianapolis (IUPUI), Indianapolis, Indiana

A university program that began in 2008 and currently conducts two programs: a four-year Motorsports Engineering Degree and a Certificate in Motorsport Studies.

Performance Institute and Training (PIT), Charlotte, North Carolina

PIT have been in operation since 2001. They conduct two different motorsport training programs, along with other programs aimed at instilling that ‘race team’ culture into other businesses via team bonding sessions.

Winston-Salem State University (WSSU), Winston-Salem, North Carolina

With the motorsports department based at the oldest asphalt oval still in operation in the USA, the Bowman Gray Stadium, WSSU, is cited as the only ‘historically black college and university’ and is using their Motorsports Management Program to complement the Drive for Diversity program initiated by the National Association for Stock Car Auto Racing (NASCAR).

University of North Carolina (UNC), Charlotte, North Carolina

A university-based program of four years duration with a newly constructed purpose-built facility.

Executive Summary

Major Race Team Workshops, North Carolina

Michael Waltrip Racing (MWR) Raceworld USA, Cornelius, North Carolina

MWR occupies a large facility housed in a converted picture theatre complex. Now only a shell of its former self, it still retains one theatre. It has a very impressive layout with ample room for all operations of the team and even houses their own water jet cutting machinery.

Penske Racing, Mooresville, North Carolina

Roger Penske's (CEO) stated philosophy is *"performance paired with style"*. This is evident throughout, from the gleaming Italian floor tiles and black leather chairs in the entrance foyer, to the impressive, immaculately clean, expansive racecar building facility.

Roehrig Engineering, Lexington, North Carolina

Roehrig is America's most recognisable damper dynamometer manufacturer, manufacturing machines to test not only motor vehicle dampers, but dampers of any description, used in many different industries.

Information was sought in the areas of:

- Safety in all areas impacting the motorsports environment, from drivers to spectators
- Sustainability in its many facets and how it impacts the modern day operations of race teams
- Green initiatives, the development or adoption of technologies to promote the green message in relation to the motorsport industry and its operations
- Technological advances in products and services
- Comparing the difference in motorsport training programs, their content and delivery
- The necessity for a minimum qualification level for those working in the industry
- Promoting and fostering international relationships

The findings of this Fellowship investigation were pleasantly surprising, in that in almost every aspect included in this study the Australia industry is either on equal footing, or in some cases, more advanced than the relevant counterparts in the USA.

The report concludes with recommendations for government, industry, education and training and the motorsports controlling bodies.

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Abbreviations/Acronyms

AASA	Australian Auto Sport Alliance
ACCUS	Automobile Competition Committee for the United States
AVESCO	Australian Vee Eight Supercar Company
CAMS	Confederation of Australian Motor Sports
CEO	Chief Executive Officer
CoT	Car of Tomorrow
CotF	Car of The Future
E85	A fuel mixture of up to 85% ethanol and 15% gasoline or other HydroCarbon (HC) by volume.
ECU	Edith Cowan University
FIA	Federation Internationale de l'Automobile
GFC	Global Financial Crisis
GRAND-AM	Grand American Road Racing Association
HANS device	Head and Neck Support device
HC	HydroCarbon
HSE	Health Safety and Environment
IMA	Indiana Motorsports Association
IMIS	International Motorsports Industry Show
IMSA	International Motor Sports Association
IRL	Indy Racing League
ISS Institute	International Specialised Skills Institute
IUPUI	Indiana University-Purdue University Indianapolis
LPG	Liquefied Petroleum Gas
MSA	Manufacturing Skills Australia
MSBF	Motor Sport Business Forum
MTA	Motorsports Training Australia
MWR	Michael Waltrip Racing
NASCAR	National Association for Stock Car Auto Racing

Abbreviations/Acronyms

NHRA	National Hot Rod Association
NSA	National Sports Associations
NTI	NASCAR Technical Institute
OHS	Occupational Health and Safety
OVAE	Office of Vocational and Adult Education
PIT	Performance Institute and Training
PPE	Personal Protective Equipment
PRI	Performance Racing Industry
SAFER	Steel and Foam Energy Reduction
SEMA Foundation	Speed Equipment Manufacturers Association Foundation
SCCA	Sports Car Club of America
TAFE	Technical and Further Education
UNC	University of North Carolina
USA	United States of America
USAC	United States Auto Club
V8SA	V8 Supercars Australia
VACC	Victorian Automobile Chamber of Commerce
WSSU	Winston Salem State University

Definitions

Design

Design is problem setting and problem solving. Design is a fundamental economic and business tool. It is embedded in every aspect of commerce and industry and adds high value to any service or product—in business, government, education and training, and the community in general.[1]

Innovation

Creating and meeting new needs with new technical and design styles. (New realities of lifestyle).[2]

SFI Foundation

An independent spin-off foundation from the SEMA Foundation.

Skill deficiency

A skill deficiency is where a demand for labour has not been recognised and training is unavailable in Australian education institutions. This arises where skills are acquired on-the-job, gleaned from published material or from working and/or studying overseas.[3]

There may be individuals or individual firms that have these capabilities. However, individuals in the main do not share their capabilities, but rather keep the intellectual property to themselves. Over time these individuals retire and pass away. Firms likewise come and go.

Sustainability

The ISS Institute follows the United Nations for Non-Governmental Organisations' definition on sustainability: *"Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".*[4]

[1] 'Sustainable Policies for a Dynamic Future', Carolynne Bourne AM, ISS Institute 2007.

[2] ibid.

[3] 'Directory of Opportunities. Specialised Courses with Italy. Part 1: Veneto Region', ISS Institute, 1991.

[4] http://www.unngosustainability.org/CSD_Definitions%20SD.htm

Acknowledgements

Bayden Clissold would like to thank the following individuals and organisations who gave generously of their time and their expertise to assist, advise and guide him throughout the Fellowship program.

Awarding Body – International Specialised Skills Institute (ISS Institute)

The International Specialised Skills Institute Inc is an independent, national organisation that for over two decades has worked with Australian governments, industry and education institutions to enable individuals to gain enhanced skills and experience in traditional trades, professions and leading-edge technologies.

At the heart of the ISS Institute are our Fellows. Under the **Overseas Applied Research Fellowship Program** the Fellows travel overseas. Upon their return, they are required to pass on what they have learnt by:

1. Preparing a detailed report for distribution to government departments, industry and educational institutions.
2. Recommending improvements to accredited educational courses.
3. Delivering training activities including workshops, conferences and forums.

Over 180 Australians have received Fellowships, across many industry sectors. In addition, recognised experts from overseas conduct training activities and events. To date, 22 leaders in their field have shared their expertise in Australia.

According to Skills Australia's 'Australian Workforce Futures: A National Workforce Development Strategy 2010':

> Australia requires a highly skilled population to maintain and improve our economic position in the face of increasing global competition, and to have the skills to adapt to the introduction of new technology and rapid change.
>
> International and Australian research indicates we need a deeper level of skills than currently exists in the Australian labour market to lift productivity. We need a workforce in which more people have skills, but also multiple and higher level skills and qualifications. Deepening skills across all occupations is crucial to achieving long-term productivity growth. It also reflects the recent trend for jobs to become more complex and the consequent increased demand for higher level skills. This trend is projected to continue regardless of whether we experience strong or weak economic growth in the future. Future environmental challenges will also create demand for more sustainability related skills across a range of industries and occupations.[5]

In this context, the ISS Institute works with Fellows, industry and government to identify specific skills in Australia that require enhancing, where accredited courses are not available through Australian higher education institutions or other Registered Training Organisations. The Fellows' overseas experience sees them broadening and deepening their own professional practice, which they then share with their peers, industry and government upon their return. This is the focus of the ISS Institute's work.

For further information on our Fellows and our work see www.issinstitute.org.au.

[5] Skills Australia's 'Australian Workforce Futures: A National Workforce Development Strategy 2010', pp. 1-2 http://www.skillsaustralia.gov.au/PDFs_RTFs/WWF_strategy.pdf

Fellowship Sponsor

The Victorian Government, Skills Victoria is responsible for the administration and coordination of programs for the provision of training and further education, adult community education and employment services in Victoria and is a valued sponsor of the ISS Institute. Clissold would like to thank them for providing funding support for this Fellowship.

Employer Support

An acknowledgement is extended to Wodonga Institute of TAFE, which allowed and supported the Fellow's application and participation in the Skills Victoria (TAFE)/ISS Institute Fellowship. In doing so, Wodonga TAFE permitted the Fellow to travel to the United States of America (USA) to conduct this fact-finding study tour of the international motorsports industry.

Supporters

The following individuals, organisations, and companies have supported this submission and development of the Fellowship:

- Chris Blomfield-Brown, Owner, CB Squared
- Chris Clark, General Manager, Brad Jones Racing
- Julia Farrell, Manager – Training and Development, Confederation of Australian Motorsport
- Kim Jones, Co-owner, Brad Jones Racing
- Brad Jones, Co-owner, Brad Jones Racing
- Ric Kemp, Owner, Race Technique Engineering
- Chris Lambden, Publisher, Motorsport News
- Michael Navybox, Owner, Navybox School of MotorSport
- Bob Paton, CEO, Manufacturing Skills Australia
- James Ward, Co-owner, Aussie Racing Cars

The Fellow extends his gratitude to the following respondents to the questions asked during his visits in the USA:

- Bruce Ashmore, Gold Crown Championship.
- Ken Green, formerly of Andretti Green Racing
- Tom Weisnebach, Indiana Motorsports Association (IMA)

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- Bryan Blake, General Manager, Enterprise, Training and Development, Wodonga Institute of TAFE
- Michael O'Loughlin, Chief Executive Officer, Wodonga Institute of TAFE
- Brendan Tenison-Woods, Manager, Motorsports Training Australia
- The Executive Committee of Wodonga Institute of TAFE

Organisations Impacted by the Fellowship

Government

It is the Fellow's opinion that there are no specific Australian Government bodies directly involved with the development and control of policies and standards across the motorsports industry at this time. This is left to the industry itself and the professional associations listed below.

Industry

- Teams involved in motorsports in varying categories at different levels of the competition spectrum
- Parts and service suppliers to the motorsports industry

Professional Associations

- Australian Auto Sport Alliance (AASA)
- Confederation of Australian Motor Sport (CAMS)
- Manufacturing Skills Australia (MSA)
- V8 Supercars Australia (V8SA)
- Victorian Automobile Chamber of Commerce (VACC)

Education and Training

- Edith Cowan University (ECU)
- Kangan Batman Institute of TAFE
- Motorsports Training Australia (MTA) – Wodonga Institute of TAFE

Community

- Those individuals, both paid and volunteer, who are involved in the many aspects of motorsport
- The motor racing spectators, without whom the industry would not exist

About the Fellow

At the time of the Fellowship trip, Bayden Clissold was employed with Motorsports Training Australia (MTA), a business division of Wodonga Institute of TAFE, located in the northeast region of Victoria. He has since moved to Queensland to take up a different position.

A qualified motor mechanic with 32 years experience in the automotive industry, and in small business, including owning three businesses, the Fellow was looking for something a little more fulfilling than just working on the average family vehicle, which led him to pursue a career at Motorsports Training Australia (MTA) with a trade qualification and Certificate IV in Training and Assessment.

As a new trade-based teacher/facilitator in 2005, the Fellow was on a fairly steep learning curve, but progressed from entry-level teaching through to senior educator and the position of Team Leader for the Motorsports department. During this time, he was afforded numerous personal self-development opportunities in everything from basic computer software packages to training in such things as staff supervision.

In six, seemingly short, years with MTA, was been fortunate enough to be able to interact with some of the best people in the motorsports industry and has developed a close working relationship with Albury's local V8 Supercar team, namely Brad Jones Racing.

One of the highlights of the Fellow's career thus far was being awarded the TAFE Development Centre Fellowship in 2008. This Fellowship enabled him to undertake study and complete the Associate Degree in Vocational Education and Training at Charles Sturt University.

Aims of the Fellowship Program

To promote and develop international relationships in the motorsports industry.

Both the IMIS safety seminar in Indianapolis and the MBF conference in Orlando were instrumental in the plans to achieve this objective. Many contacts were made and details exchanged with representatives from all areas of the motorsport industry. Perhaps the biggest and potentially the most rewarding was Tom Weisenbach, Executive Director of the Indiana Motorsports Association (IMA). Weisenbach is one of the partners responsible for bringing a motorsports-specific trade show back to Indianapolis, in the absence of the PRI trade show, after the organisers decided to relocate to Orlando some five years ago.

These trade shows also proved useful in making contact with motorsport training providers from the USA. As a direct result of the Fellow's attendance at the trade shows, visits were subsequently planned with the intention of comparing training facilities and course content.

Identify international employment opportunities in motorsports.

With the forming of international relationships, the aim was to hopefully encourage an exchange of information, which would improve the understanding between the two countries, and lead to increased employment opportunities for local students who would like to pursue the challenge of working overseas.

Unfortunately, due to the continuing financial constraints as result of the Global Financial Crisis (GFC), there appeared to be a severe shortage of employment prospects in the industry in the USA, with more than a number of people losing jobs as the teams shed expenses in an effort to remain financially viable. This trend could well be turned around in the near future, given the very positively charged environment that was evident at the trade show and MBF.

Understand the design of future motorsports training in the USA.

The variety of motorsports training in the USA was the first thing that became evident. With every training program uncovered, there was a change in focus in relation to the training delivered as part of that program. Population size and density undoubtedly played a large role in deciding whether any particular educational program would be successful or not. Therefore, given the size of the population USA, Clissold found that there was a wider variety of successful racing categories, deeming it necessary for a larger, more diverse range of specialisations within the industry. This then provided opportunities for a wider range of training programs.

With the steady increase in population in Australia and the growing pressure focussed upon removing the 'hoon' element from our streets, the signs are there for a steady growth within the motorsports industry, right here in our own backyard.

Gain information and knowledge in reference to environmental and general sustainability issues.

Environmental sustainability plays a role in the social acceptance of motorsport, but there is a more pressing issue at this point in time; that of commercial sustainability. Every business must maintain the financial rigour to withstand the current and future economic downturns to be commercially viable.

To enable a direct comparison between the USA and Australia on safety and general safe working practices.

There was a time not long ago that safety, both on and off the track, was not high on the priority list when it came to motorsport competitions. With the evolution of, and emphasis on, safety in the working environment, motorsport has followed this emphasis diligently and can now boast a reasonable reputation in a very demanding, challenging, yet sometimes dangerous, environment. Based on his observations during the Fellowship visits, it is the Fellow's opinion that the motorsports industry in Australia meets and often exceeds the safety standards displayed in the USA.

Observations at local Australian events and discussions held in the USA indicate that safety is no longer a subject to be ignored, but rather something that sits very high up on the agenda of every successful race team.

Evaluate local motorsport training facilities in direct comparison with those in the USA.

Evolution and the natural instinct for improvement have been at the forefront here in Australia, particularly in the realm of motorsport training. In the eleven short years since the inception of motorsport training, there has been a steady increase in the number of providers offering this niche training. Being directly involved with MTA for the last six years has allowed the Fellow to gauge the steady progress to date and the many improvements that have occurred along the way.

Comparing the training facilities the Fellow visited in the USA, it is obvious that there is a big difference between USA motorsport training providers and their Australian counterparts. This applies to their facilities and their content, their method of attaining funding (private or public), their student cohort and the size of each institution itself.

It is now the Fellow's considered opinion that considering the relative populations of the two countries, the quality of motorsport training at MTA is comparable to programs with similar content in the USA. The major differentiation between the two countries is in the vastly superior variety and scope of the training available in the USA.

The Australian Context

The Australian Motorsport Industry: Past, Present and Future

Past

Motorsport in Australia has developed from humble beginnings, where those with the passion to compete, to fulfil their need for challenge and to feed their adrenaline-charged desire for victory, had to rely on the goodwill of others to help support their venture into the world of speed. This support usually came at very little expense, with many friends and colleagues happy to help out, to get some time away from home and to enjoy some of the excitement normally afforded to participants in highly paid arenas. The very meaning or perhaps the interpretation of the term 'excitement' was often challenged when things weren't going your way on a bad weekend. However, most of the bad weekends were rapidly forgotten when the team did well and the car/driver combination finished somewhere near the front of the field.

A typical race weekend consisted of loading the racecar and supplies/parts on a tandem trailer, and leaving home sometime on a Friday (whatever time everyone could finish their 'real' work), driving long hours and usually camping outside the gates of the track to maximise their available time on the track once the gates opened.

Accommodation for members of the team for the remainder of the weekend would range from the tow vehicle, a tent, a caravan, or, for those who were feeling rich, a hotel/motel room. Motel accommodation was often considered as an unnecessary expense and that money could be better spent on the racecar.

Food requirements were usually met with takeaway food, or a traditional barbecue during the race days. Liquid refreshment usually came in the form of beer, consumed after the days official proceedings.

In this environment the capabilities of individual members of the pit crew were recognised more by whether the crew member could still carry out the functions required on race day.

This scenario was not typical for every race team, but during the journey from hobby/part-time race team to semi-professional or fully professional race teams, most people involved in the industry have suffered similar experiences at some point in time.

Present

Modern race teams have adopted a more professional approach. They have now recognised the importance of having all members of the team, operating as a well-trained, cohesive unit. Each member of the team generally has a designated specific role, and they are all regarded as equally important. These 10 present-day factors demonstrate that at any level there is no longer one single most important person or factor in what has truly become a team sport in every sense of the word.

1. Transport no longer involves a trailer, but rather a million dollars worth of race vehicles and rolling stock, placed in the hands of a professional transport driver who is properly trained to safely move the team's assets across the country.
2. Accommodation now consists of pre-arranged motel bookings organised by the team secretary to ensure that all members of the team can relax in reasonable comfort when not physically at the track.
3. All race team members are now fully versed in every aspect of the race vehicles that the drivers propel around the race circuit at ridiculous speeds to quench the thirst of the spectating public, as well as the team's euphoric thirst for success. Team members have usually undergone some intensive training during their motorsports career.
4. Sponsors play the major role in keeping the team functioning as a viable business entity. Therefore, team members now have strict codes of conduct enforced to maintain the professional image of the team and not to tarnish the team's reputation.

5. Professional drivers pilot the race vehicles around the circuit in the chase for a position on the winners' podium. Drivers can earn six-figure salaries equivalent to that of any elite athlete from any other sporting discipline.
6. The team now employs the services of a dietician to ensure that all team members are able to operate at their optimum performance level.
7. Then there is the team physiotherapist, who not only to attends to the drivers but also every member of the team in this physically demanding environment.
8. Team owners now have increased responsibilities to all stakeholders of the team, as without their commitment, the team would not exist and the industry would flounder.
9. Teams rely heavily on their marketing people to keep their team's performance at the top of every race follower's mind and maximise exposure for their sponsors; thereby, giving value to their sponsor's investment in the team's operations.
10. On race weekends, and indeed now increasingly on non-race days, spectators need to be constantly engaged to lift the profile of the team and its members to repay the sponsor's investment.

In 2009/2010 the Australian motorsports industry has faced the most challenging time in our nation's history, and the even shorter history of the industry itself. These challenges are in the form of economic, political and environmental concerns. Challenges that have been made even more demanding, due to the ongoing GFC. Because of this truly global economic downturn, every nation has felt the economic pinch in some form. There has been wide spread collapse of some of the biggest, strongest and oldest established business organisations, the ripple effect has been felt by almost every business at this point in time. This has caused many sponsors to re-assess their financial strategies in an effort to maintain survival in an uncertain marketplace.

Motorsport at the top level in Australia, namely V8 Supercars, from a spectator point of view could scarcely be classed as a 'sport' any longer and probably fits more neatly into the 'professional entertainment' category. This does bring about a reliance on sponsorship dollars to make the wheels go round. In many cases sponsors have removed their funding almost overnight due to their own financial difficulties.

Faced with an unprecedented and uncertain history, those teams operating at anything above part time or amateur level have suffered financially. No longer can teams rely solely upon relationships that have been forged over many years. Teams are now forced to think smarter and re-assess their business operations. The pressure is on to survive this current crisis any way possible, which resulted in many teams re-assessing their workforce and eliminating the surplus (which unfortunately seems to occur whenever there is a financial squeeze).

The resultant downsizing means that teams have to be more aware of employees' capabilities. Not only with their ability to conduct the job at hand, but also their ability (or rather suitability), to undertake extra training in an effort to increase their value to the team.

Future

Australian motorsport will still exist in the future, albeit with slightly altered priorities. Economic viability is set to become the number one priority for all race teams in the fight to stay alive in a depressed economy. Lessons learnt from the recent past will place the survivors in good stead to sustain their involvement for the foreseeable future.

The race vehicles used will be powered by engines using alternative and renewable fuel resources; most of the componentry on the car will become 100% recyclable. Increased reliability of components will become mandatory as regulations limit the number of times these components can be replaced without penalty during race meetings. The amount of research and development that has taken place as a matter of necessity will see the motorsports industry once again become the testing ground for new technologies. The ingenuity of those involved in the industry will take the theories adopted by the major vehicle manufacturers and developed in a time of dwindling natural resources, and tweak their machinery to take ultimate advantage.

As shown in the Australian Bureau of Statistics Spectator Attendance at Sporting Events, 2009–2010 statistical review, motorsport will proudly boast an entirely different public image, it will provide unprecedented spectator involvement and value-for-money family entertainment. The industry will still, however, struggle to overtake Australian Rules football and horse racing as the most watched sport in the country, lingering equal third with Rugby League.[6]

Notwithstanding this, all levels of motorsport will show an increase in activity due to the successful campaigns for better driver education and the need to foster safer driving in the public arena.

SWOT to the Industry: an International Perspective

The following suggestions were made by Tom Weisenbach (TW), Kim Green (KG) and Bruce Ashmore (BA) regarding the strengths, weaknesses, opportunities, and threats (SWOT) to the US motor racing industry as it stands at the moment. The same three USA motor vehicle industry leaders were also directly involved in the discussion on skills deficiencies surmised in the 'Identifying the Skills Deficiencies' Chapter and highlighted in full in the 'Attachments' Chapter.

Strengths

- Number of races (TW)
- Strong grass roots racing industry (KG)
- Marketing and business acumen in the USA is at very high standard (BA)

Weaknesses

- Poor leadership (TW)
- A large country that makes it difficult to bring junior racing series drivers together to compete (KG)
- Zero development and green relevance (BA)

Opportunities

- Get fans to come back (TW)
- Easy to get started but difficult to make it to the top levels – money (KG)
- Improvement changes will get rewarded. Motor sport will get worse before it rediscovers itself, now is a good time to get involved (BA).

[6] http://www.abs.gov.au/Ausstats/abs@.nsf/0/1F8FAC9C2C7B1623CA2568A900139417?Open

Threats

- Not letting fans know you care (TW)
- Economic downturns (KG)
- Environmental issues and other sports such as football gaining market share on the ticket buying public (BA)

Following this discussion, each of these respondents was asked a series of questions relating to the skills deficiencies identified by the Fellow. A complete write up of the questions asked and comments received from the three interviewees is included in the 'Attachments' Chapter. A brief summary of the major outcomes of these discussions is included in the following chapter.

Identifying the Skills Deficiencies

It should be noted that the Fellow has largely concentrated on NASCAR when referencing the USA, and V8 Supercars when referencing the motorsports scene in Australia. Other motor racing categories have not been neglected on purpose as each discipline could virtually make the subject of another report.

Differentiate the Factors Related to Trend Analysis Pertaining to the Australian Motorsport Industry

Who controls motorsport in your country? Is there one controlling body, or are there different controlling bodies for different forms of motorsport?

Motorsport in the USA is controlled by the Automobile Competition Committee for the United States (ACCUS). This body serves as the interface between the Federation Internationale de l'Automobile (FIA) and its member clubs in the USA, comprising eight sanctioning organisations, including NASCAR. ACCUS appears to be the equivalent of the Confederation of Australian Motorsport (CAMS) in Australia, with both bodies being the FIA-delegated National Sporting Authority (NSA) for their respective countries.

What is the average build cost of a current NASCAR?

The introduction of the Car of Tomorrow (CoT) in the USA has reportedly increased costs to teams in the short term through tighter controls on body specifications and teams having to build completely new vehicles, being off set in the long-term due to the decreased requirements for research and development that will deliver significant savings.

The Fellow commented, *"It would appear that it is just as difficult to obtain the cost of construction of a current NASCAR, as it is to obtain an accurate cost for a current Australian V8 Supercar, with no factual figures available due to teams not willing to disclose certain financial details. The V8 Supercars competition in Australia is also well towards finalising the build of the first Car of the Future (CotF) with Peter Ceprnich and Pace Innovations having completed most of the work on the basic chassis as of October 2010".*

Has there been a similar evolution in the USA as there has been in Australia with the cars or category rules?

For NASCAR the CoT has been the biggest evolution in modern times. Introduced for all the right reasons, the full intentions weren't realised with the implementation. NASCAR has actually failed on such things as short-term costs, increased danger due to closer racing, separation from standard vehicles, and acceptance of changes.

The Fellow believes that the Australian industry could learn from studying the successes and failures in development, progression and implementation of the CoT.

To what extent has the adoption of new technologies influenced the development of the current NASCAR approach?

Other than in development of the CoT, NASCAR appears to have deliberately kept development of the mechanical components of vehicles low-key to curtail costs, and remove areas where teams could gain a large competitive advantage. Much time and money, however, has been spent on safety, using new car construction methods and technologies in an effort to increase driver safety.

There has been talk for some time now of NASCAR adopting fuel injection in place of the carburettor in an effort to make use of current ethanol blended fuels and improve fuel economy, engine reliability and life span.

The Fellow commented, *"This is one area where the Australian V8 Supercar is well advanced over its USA counterpart"*.

Is there a main area of focus by teams in an effort to gain that competitive advantage?

With the changes to the current NASCAR racecars and regulations, any real areas of development have been removed. With a decrease in track testing opportunities, efforts are focused on areas where incremental gains may be found without having the vehicle leave the workshop. To find that competitive advantage is now harder and more costly.

An old adage that seems to be losing credibility in Australia, due to the similarity of Ford and Holden in V8 Supercars is 'win on Sunday, sell on Monday'. Does that adage hold true in the USA?

It used to hold true, a manufacturer that had success on the racetrack could expect higher than normal sales enquiries the following week. Coupled with the financial crisis that car companies have faced, loss of identity with current road going versions is cited as the possible cause for demise of that old adage. For whatever reason, it certainly doesn't hold as true. Nowadays supporters are encouraged to follow the driver rather than the manufacturers.

If NASCAR did not exist, what do you see as being the premier racing category in the USA?

As long as there are modes of transport for the masses sold by different manufacturers, there will be stock car racing in the USA and some form of production-vehicle-based racing in Australia. If NASCAR was to disappear, it seems to be accepted that open wheeler racing (more particularly Indy Car) would be the most popular form of motor racing.

The ongoing success of any particular category being touted as that country's 'premier' racing series depends largely on the appeal to the average race fan. Lose that appeal and face the consequences.

Can you see any other forms of motorsport or racing categories on the horizon as 'the next big thing in motorsport'?

There doesn't appear to be any one particular item on the horizon that could be identified as 'the next big thing' in USA motorsport. According to Kim Green *"There is a definite interest in racing cars utilising alternative fuels".* However, this area is not receiving anywhere near enough consideration at this point in time.

Can you briefly describe any 'homologation process' that is in place in NASCAR?

Bruce Ashmore's stated response was, *"NASCAR adopts a very stringent rule package. To be eligible for entry into a NASCAR event each component of the car and all its variants must be submitted by the various manufacturers for inspection by NASCAR officials at the NASCAR technical centre. These examples are displayed at the technical centre for competitors and officials to view. Any component found at the track where an example hasn't been lodged at the technical centre is instantly banned from competition. This process brings officials, team members and other manufacturers into the policing/scrutinising process. In this way everyone involved with the category gets a say in the process of ensuring compliance with the regulations".* Ashmore further suggests that, *"This system is definitely worth consideration by any other sanctioning body".*

Analyse and Record Information Pertaining to Advances in Safety Practices

How important is training for pit crew safety, given that the USA is continuously reported as being such a highly litigious society?

Tom Weisenbach stated, *"Safety should be the most important part of any race",* while Bruce Ashmore agreed and added, *"Very important".* Kim Green went further and stated, *"Training is critical for the competition side – speed and execution is everything in a pit stop and often the pit stop wins races".*

There appears no doubt that safety has become a subject of close scrutiny and high importance. Many training programs have sprung up to meet the demands for training crew members to the professional athlete level.

Can you briefly describe the safety or Personal Protective Equipment (PPE) required for both driver and pit crew in relation to safety?

Driver safety has been vastly improved with the redesign and introduction of the CoT in NASCAR. The driver must wear fire-resistant Nomex Race Suits, underwear and socks, and a Nomex Head Sock or balaclava. This creates what would have to arguably be the harshest working environment, to the point where drivers are often in danger of collapse from the effects of heat exhaustion and dehydration.

Pit crew members are required to wear protective clothing almost equal to that of the car driver. This includes fire retardant suit, gloves, shoes and helmet. It was suggested that in NASCAR there were more fatalities in the pits than on the track. This statement, whilst unsupported by actual confirmed data, seems quite plausible considering the proximity to the racing surface and largely unprotected nature of the pit road at some of the regular racetracks in the USA.

The Fellow commented, *"By comparison the incidence of major injuries or fatalities in Australia would be very small when expressed as a percentage of the total number involved".*

Effective and safe management of pit stops during a race has always appeared to be a problem in Australia and in the USA. What changes have been made to increase the efficiency and safety of pit lane servicing?

Pit stops have become a critical part of race strategy; therefore, proper management is extremely important in the pursuit of a good race result. Compared to years gone by, the pit lane is a much safer environment.

Kim Green summed it up with the following statement, *"Over the last 10 years there have been rule introductions in the way of crew uniforms and helmets etc. [are designed]. [These] have drastically improved the safety for the crews along with the implementation of pit lane speed limits – which certainly were not in place when I was an over-the-wall pit crew member on the Indy Cars. It was quite the scene to have Indy Cars racing down pit lane and 200 mph-plus speeds at some oval tracks – and less than five feet from my ankles as I was doing a pit stop!"*

Have there been any significant advances in track layout or design to increase safety?

The single biggest innovation is the development of the Steel and Foam Energy Reduction (SAFER) barrier (details can be found in 'The International Experience' Chapter of this report). This coupled with a redesign of the infield runoff areas has provided a much safer workplace for the drivers.

The adoption of the Head and Neck Support (HANS) device has increased a drivers chance of survival should any unplanned incident happen. Other than the use of the SAFER barrier, in these and all other areas the Australian motorsports industry seems to be up to date.

Is there a set layout for the pit area, or does it differ from team to team?

What works well for one team and cuts down pit stop time quickly gets noticed and copied. In NASCAR as much as it is with V8 Supercars in Australia, any team that appears to gain an advantage from any change, no matter how minor, very quickly has that change duplicated. In the late 1990s it was realised that there was considerable time to be saved during the actual pit stop by properly orchestrating the movements of the pit crew members. Pit stops are now studied and performed in much the same way that a dance routine is choreographed, to the most minor detail.

Do you prefer to train people 'in house' or do you look to training organisations such as 5 Off 5 On for new staff?

Within the motorsports industry both in Australia and the USA it appears that teams are looking for workers with at least a basic knowledge of the mechanics of a racecar and the willingness to learn. Kim Green confirmed this by stating, *"Basic knowledge of a job position is preferred and then we train the employee. This allows us to instil our procedures and philosophies on the employee".*

The Fellow commented, *"As in Australia, some teams do consider training organisations as a source of supply for potential crew members. Most of the larger American NASCAR teams have their own pit lane coaches who deal specifically with the 'over the wall' crew".*

Fatigue management is an issue with any race team, are there any particular methods you use for fatigue management?

In today's competitive motorsport environment, as in any other team sports, team managers now employ their own specialists, such as dieticians, sports trainers, and chefs to manage fatigue. Crew members normally undergo some kind of fitness training and well prepared meals and snacks are supplied by the teams' chef as part of the normal routine at race events to ensure capability and high performance of the team.

Sensible working hours at the race also aids in managing fatigue as well. With workdays getting underway early they also finish reasonably early, with 4.30 pm being the norm and this helps too. Long days and weekends, other than race weekends, are kept to a bare minimum to allow team members to spend quality time with friends and family.

Can you give a brief rundown on the methods of communication in use, particularly during hectic pit activity?

Both countries seem to follow very similar processes in regards to communication. This consists of radio communication between driver and important crew members during racing activities. Signs and hand signals are also used during the actual pit stop by various crew members, particularly to indicate a problem during the stop.

How would you rate the performance of most teams in the field of safety management and work practices?

Teams are constantly improving both attitude and action in the area of safety. As Bruce Ashmore stated, *"You cannot afford to lose positions in the race or expensive highly trained personnel".* In reality any involvement in motorsport is all about performance and winning races, but safety is an issue that cannot be ignored if teams are to have any chance of putting in consistent performances. Ashmore then further stated, *"A safe team is also a fast team and it is generally that team that wins the championship".*

The safety message isn't wasted on the team just for their benefit either, with spectator safety being a very high priority. Kim Green says of the Indy Car series, *"The Indy Car Series encourages and allows the fans to get close to the teams and drivers throughout an event so having well organised fan safety is critical".*

Analyse and Record Information Pertaining to Sustainability Initiatives and Practices

In a few words, what would you put forward as the biggest challenge or challenges to the motorsport industry on a global or local scale?

Reduction in operating costs and the battle for both the fan base and corporate support are cited as the most challenging aspects for long-term sustainability.

Identifying the Skills Deficiencies

Increasingly, motorsport, like many other professional sports, has become a part of the entertainment industry and this has changed the way the sport operates. The availability of the sponsorship dollar is dependant upon the amount of fans the sport and the team can reach and hopefully translate into product sales.

Briefly explain the pressures existing to give motorsport a 'greener' image in the USA.

There is currently no great pressure for the USA motorsport industry to go 'green'. Most insiders believe there is not enough being done to achieve this aim, but freely admit that it will be quite some time before most meaningful initiatives are adopted into daily routines. Most sanctioning bodies in the USA are trying to become proactive and keep ahead of the game in relation to the 'green' movement and any government regulations.

It is well worth mentioning a vehicle with a totally green focus that was on display at the PRI tradeshow. The subject is an electric powered open-wheel vehicle, it is hoped this will form the basis of a totally new race series. Founded by media proprietor Ben Johnston, the vehicles will be based on Reynard and Panoz Champ cars. The series aims to provide a platform for all green initiatives in the automotive industry.

Prototype open wheeler for the 'Green Prix'

The 'heart' of the green prix machine is the electric motor (red). There are two electric motors in this machine.

Where are the identified pressures coming from? Internally, externally, the public, or the government?

The USA Government and public interest groups are demanding automotive manufacturers and the automotive industry in general to adopt green initiatives, but as yet only minimal external pressure to 'green-up' the motorsport industry exists.

There is no doubt that the day will come when mounting pressure will change the face of motorsport forever (not necessarily for the worst) with sanctioning bodies and category organisers being well aware of the situation, slowly introducing new initiatives as they become accepted by the general public.

How much has the GFC affected the motorsport industry in the USA?

The GFC severely impacted the entire USA economy, as it did in most countries around the world. Major teams in the USA suffered a loss of major sponsorship dollars as most businesses cut costs in an effort to ride out the GFC.

This had an immediate impact on the amount of dollars teams had available to keep operating. Most teams shed workers in an effort to decrease their total spend, resulting in those considered to be in excess to requirements having to find new jobs.

Briefly describe the measures that have been implemented towards the sustainability of motorsport in the USA. I assume there have been measures in the past, with changes in regulations coming under this banner, for example, environmental, economic, and social.

"Nothing is responsible for sustaining motorsport. Motorsport survives because people want to do it. And want to be seen doing it", suggests Bruce Ashmore.

"The majority of teams survive on money from sponsors who expect good exposure in their pursuit of a decent return on investment. With this in mind the GFC has shown most teams that there are many facets to the term sustainability. One of the most important has turned out to be the fight for 'economic' sustainability. This has forced team owners and managers to become more financially responsible in their everyday dealings. That being said, teams will still find ways to spend the majority of their income on developing their cars to perform better in an effort to make the race, or improve their on-track performance. Teams have been challenged with exercising good financial control, trimming expenses without trimming performance," he said.

Can you see the evolution of alternative or biofuels playing a big role in the future of motorsport and the way that you currently do business?

The resounding response to this question was yes. Alternative fuels will play a big role in the motorsport scene in years to come, with Tom Weisenbach, however, predicting, *"I don't think it will make its mark on the racing industry for another 15-plus years".*

Others might beg to differ, with Indy cars already using 100% fuel-grade ethanol fuel. Some other categories and forms of motorsport have been using Liquefied Petroleum Gas (LPG) for some time. There is some experimentation with hydrogen powered and hybrid racecars, but, as yet, there are no practical examples of these cars actively competing. Diesel fuel technology has been keeping pace with change and this has seen a number of diesel fuelled vehicles winning quite a few races around the world, although this is due largely to the decreased fuel consumption which results in less pit stops, as much as anything else.

What measures do you employ to reduce the impact of your operations on the environment?

The ideas of both competing in motorsport and being environmentally conscious seem to be at opposite ends of the spectrum. Motorsport is all about competition and winning. With this thought in mind Bruce Ashmore feels that the environment, *"Isn't given a thought"*. While Kim Green reports, *"With the racing team I owned we were always very conscious of being environmentally responsible"*. Green goes on to state, *"As promoters we would even work with local governments and encourage race patrons to adopt the recycling mentality".*

The Fellow's opinion is that no single person in motorsport goes into competition with the intention of damaging the environment, but if racers are to become more environmentally responsible, Ashmore believes that, *"The rules need to be in place to promote these thoughts".*

Do you see the reduction of our 'carbon footprint' as being important? This includes participation at events and transportation to and from events.

Unless teams are forced to comply with changes to certain rules and regulations in order to reduce the carbon footprint involving motorsport, the issue probably won't be given any serious consideration. It would also appear that motorsport could be an excellent billboard for creating awareness of environmental issues, including the reduction of an individual's carbon footprint, as opposed to carbon footprint reduction for the industry as a whole.

Gather Information and Gain Knowledge Regarding the International Motorsport Environment, Current Technologies, Methodology, Products And Services

How do you effectively manage staff when you have so many race commitments during the course of the year?

In the motorsport industry where long hours both on and off the track are commonplace (particularly here in Australia), the topics of fatigue management, Occupational Health and Safety (OHS), employee satisfaction and retention take on new meaning. It is not desirable to have crew members who aren't mentally and physically prepared for the challenges that will present themselves at any racetrack, at any time, anywhere in the world. Employee enjoyment and satisfaction are obviously fairly important goals in motorsport as they should be in any industry.

Teams adopt different approaches to achieving employee satisfaction. Some of the incentives offered to crew members range from sharing in the prize money that comes from winning races, discretionary bonuses based on a work performance basis, getting to 'stay over' in popular locations if time permits and, finally, just flying out as early as possible after a race meet so that crew members can be home to enjoy time with family and friends. Nothing motivates likes success, and another great motivational strategy is for the team to employ a driver who knows how to win.

In the USA it appears that in both NASCAR and Indy Car there is no problem with staff retention and, therefore, very little staff turnover. It sounds like a completely different situation to the teams in Australia where many team members have limited tenure; maybe there are a few lessons to be learnt from the industry in the USA.

What new technologies have been or will be introduced to motorsport in the USA and what difference will they make?

Current rules in NASCAR don't allow for development and introduction of new technologies at a team level, with all aspects of the race vehicle being very tightly controlled by the rule makers. Likewise, in the Indy Car series, which is nowadays considered a 'spec' racing series, rule makers have restricted teams to running one make of chassis, one make of engine and of controlled tyres. This has eliminated any advances in technology at the expense of manufacturer support and fan support base; who, through these changes, are now in danger of viewing the series as 'boring'.

It was generally felt by the respondents and by the general fan base that new technologies need to be introduced to give a shot in the arm to racing, particularly the Indy Car series, and to make it more relevant for fans.

What is the process for determining the development and production of new products or the redesign of existing products? Who drives the process? Is it individual teams or the motor sport industry in general?

As previously stated, category sanctioning bodies over the last few years have reduced the opportunity for any team to gain an advantage by introducing new products. When it comes to any safety related topics, teams become very vocal, and sanctioning bodies are prepared to listen. While it is important for sanctioning bodies to try and contain costs the associated with competition borne by teams, it doesn't necessarily work out that way as teams then end up spending more money on other minor areas in an effort to find that slight edge. These rules can have other undesired results, including the possibility of turning the series into a boring, sterile competition.

What do you think motorsport will look like in the year 2020 and beyond, not only in the USA, but internationally?

Bruce Ashmore believes that with the present rate of development displayed in the USA motorsport is destined to remain in, *"much the same".*

"Every time the sanctioning body implements rules to slow the cars down the team engineers will find a way to make the cars go faster", states Tom Weisenbach. The typical race engineer spends most of their time trying to find new ways to make the cars go faster over a certain distance. Weisenbach also states that, *"Racing will be alive and well beyond 2010!".*

Kim Green has a very interesting thought around the increasingly important entertainment side of the industry. Green believes that advancements in technology will bring a whole new experience to spectators with the possibility of being able to ride along with their favourite driver in a driving simulator.

What training structures are in place to skill those working in the industry e.g. TAFE institution, university or equivalent?

What bodies set the standards? What bodies write the curriculum?

What are the bodies responsible for quality control and the processes involved e.g. evaluation, monitoring reviewing?

Are these bodies government agencies or non-government bodies? What bodies run the courses?

On the subject of motorsport training Tom Wiesenbach reports that a few schools in the USA have added a handful of motorsport classes to their existing engineering programs. Indiana University Purdue University Indiana (UPUI) in Indianapolis runs a four-year motorsport engineering program. Schools mandate an internship in industry before graduation; the challenge is finding quality learning experiences for the students.

Several universities in the USA run excellent motorsport training courses in engineering, management, marketing and promotion. The latter three are the most relevant at this point in time, motorsport is now a sports marketing exercise according to Bruce Ashmore.

There are many motorsport training organisations in the USA. These range from community colleges with programs like the Rowan-Cabarrus Community College Motorsports Management Technology program and the Central Piedmont Community College Motorsport Technology program. University programs such as the Purdue School of Engineering and Technology at IUPUI, and the Winston Salem State University (WSSU) Motorsport Management Program are also popular. In addition, there are privately funded and run programs such as Performance Instruction and Training (PIT) and the NASCAR Technical Institute.

The varying organisations that offer motorsports training fund their programs differently as well. With the Community College programs receiving funding under a federal initiative through the Office of Vocational and Adult Education (OVAE) and other programs operating on a budget comprising both public and private funding sources.

While it was something of a monumental effort to obtain agreement on a nationally recognised format for training across all states and territories in Australia, it would be an impossible task to have all fifty states and the various motor racing organisations in the USA agree on a training regime.

If there was a typical motorsport career path, what would that look like?

Teams are now suggesting that the hopeful race mechanic should complete a motorsport training course first. Tom Weisenbach is of the opinion that a new employee should undertake a four-year degree with at least three summers of real life experience. What the students learn in the real world is a lot more valuable than the degree. Bruce Ashmore and Kim Green feel that helping out at the lower end of the competition scale will build the necessary skills required for long-term survival in the industry.

There is probably no such thing as a stereotypical career path in the industry. There are, however, some basic steps that every new inductee to the industry must tread. This includes the assumption that everyone must start at the bottom.

Identifying the Skills Deficiencies

Distinguish and Compare the Differences Between International Motorsport Training Facilities With Those at MTA and Investigate Different Market Areas or Sectors and Methods of Training

The Fellowship encompassed visits to three training establishments and two of the largest motorsport workshops in the USA.

To draw direct comparisons between motorsport training facilities in Australia and the USA is difficult due to the major difference that exists in relation to geographical size versus population. A feeling of inequality on a commercial basis in relation to the motorsports industry is impossible to avoid. The need for training was realised at approximately the same time, with MTA in Australia and PIT in the USA both opening in 1999. One of the most notable differences identified in the following visits to the training providers in the USA is that there are as many different course structures as there are providers themselves, with Sports Management and Marketing courses being high on the list.

Evaluate training facilities and equipment.

When visiting the chosen training facilities during the Fellowship, it became obvious to the Fellow that it was going to be a difficult task to draw direct comparisons with training facilities in the USA to those in Australia.

First, the differences in course content dictates that the resource requirements are always going to be at odds. Second, there are substantial differences in workshop facilities for those organisations that conduct a hands-on practical component to their course. This was put down to different funding models, as the most impressive facility visited was privately funded.

Does this necessarily guarantee a better training experience for the student? The Fellow believes this relies very heavily on the attitude of the students themselves, but that a better training experience can be very heavily influenced by the availability of resources.

Compare and Determine a Minimum Qualification Level for Each Sector of the Motorsport Industry for Employees in Each of Those Sectors

There is no legislative requirement for anyone working in the motorsport industry to attain any particular level of qualification.

Before undertaking this Fellowship to the USA, the Fellow believed that there should be a minimum qualification for anyone choosing to work in the motorsports industry. While he still believes this will come about some time in the future, it is not a priority issue at this point in time.

Before any such change can occur, training providers themselves must remain abreast of current and emerging trends within the sport and modify the training offered to provide what would be considered 'current industry best practice'.

Build on International Relationships and Construct International Networking and Development Opportunities, Particularly With Other Training Providers

Since the inception of motorsport training in Australia in 1999, and due to the small number of training providers in this sector, the Fellow is unaware of any international interaction. MTA is currently in their eleventh year of operation in Australia. As previously noted a similar timeframe exists in the USA. In this time there has never been a serious attempt to formulate any kind of reciprocal arrangement. The contacts developed by the Fellow during the various phases of this Fellowship will be used to ensure that at least a certain level of understanding can be maintained between the two countries.

The International Experience

Fellowship Activities – Indiana, USA

The first location for the Fellowship investigations was Indianapolis, located in Marion County in the state of Indiana. The US Census Bureau 2008 – Current Population Survey listed the population of Indianapolis at 798,382 people (http://www.census.gov/apsd/techdoc/cps/cps-main.html).

According to the website (http://www.in.gov/motorsports/Motorsports_4.08.pdf – Indiana Accelerate Your Business), produced by the Indiana Economic Development Corporation, the Indiana region is able to boast some very impressive motorsport statistics, which include:

- More than 1,200 motorsports-related companies call Indiana home.
- Indiana has the most racetracks per capita in the USA.
- Indiana is home to the Indy Racing League and the US Auto Club.
- Seven Indiana colleges and universities offer motorsports education opportunities/certifications.
- The world's premier motorsports attractions are hosted at the world famous Indianapolis Motor Speedway, including the Indianapolis 500®, the greatest spectacle in racing®; the Allstate 400 at the Brickyard; and the Red Bull Indianapolis MotoGP™. Indiana is also home to the National Hot Rod Association (NHRA) Drag Racing US Nationals and many other significant motorsport events.

This first event on the itinerary involved attending a safety conference, followed by a two-day motorsports trade show and then a seminar on six-sigma business techniques.

Motor Sport Safety Conference

It is the Fellow's opinion that in the past it had always been accepted that there is an element of danger associated with motorsport racing. This is not to imply that safety was never a consideration, but from a competitors' perspective it had been widely accepted that this element of danger was a large part of the equation – it was a case of everyone understanding and accepting that *"You knew the job was dangerous when you took it".*

It was also accepted that the task of working at race meetings as part of the pit crew brought with it certain assumed risks. These risks were decreased once a reasonable amount of experience had been gained and, with more than a fair share of near misses or mistakes, knowledge of safe working practices within the motorsport environment slowly improved.

Previously the motor racing circuit was considered exempt from the Health Safety and Environment (HSE) checks that applied to most working environments. With largely volunteer labour working within race crews it was never seen as an environment where government legislation or intervention was considered applicable, or welcome. Safety was always an area that no one wanted to raise in fear that the institution of motor racing would be placed in jeopardy.

However, the Fellow has observed many improvements occurring throughout the industry. Race teams from the lower levels all the way up to the top-level professional teams now embrace safety as a major component of their daily activities. This has come about largely as a result of self-regulation via the sports governing bodies, both internationally and locally, and the cooperation of race circuit owners and organisers.

In an environment such as motorsport, where danger is an inherent component, it would be totally naive to think that any threats to personal injury could be removed completely. In this context it is all about risk management, something that the Fellow believes most Australian teams do very well. In Australia this can be evidenced by the recently developed Standards Australia HB 192 – 2007 covering motorsport risk management, developed in conjunction with the Confederation of Australian Motorsport (CAMS).

The Motorsport Safety Conference was an opportunity for the Fellow to understand and compare the safety regulations in the USA and Australia. It began with the opening remarks by Kirk Russell, Safety Conference Coordinator.

The keynote address was delivered by John Medlen and set the background for the remainder of the conference. Medlen is the Crew Chief for John Force Racing. In conjunction with his duties at John Force Racing, and since his own son Eric's death during a drag racing accident, Medlen has assumed primary responsibility for making Eric's life count for more than six NHRA tour victories. As the manager of the Eric Medlen Project, Medlen is working with the NHRA, Ford, SFI Foundation, Inc (SFI) and others on a wide variety of safety issues. Details of the Eric Medlen Project can be found at http://www.johnforceracing.com/

The long list of speakers during the safety conference included:

- Hubert Gramling – Features and Design: Findings from the Development of the High-Speed Barrier
- Steve Mumma – Development of New FIA Debris Fence
- Dean Sicking – Recent SAFER Barrier Developments
- Dan Jones – National Fire Protection Association - NFPA 1710, A Management Tool to Make Your Track Safer
- Dave Brown – Coordination of First Response Activity
- John Oates – Selection and Use of Personal Protective Equipment (PPE) for Emergency Responders at Motorsport Events
- Andrew Mellor – FIA Institute for Motorsport Safety: Overview of 2009/2010 Research Program
- John Melvin – What Every Race Driver Needs to Know About Personal Crash Protection
- Tom Gideon – The Evolution of Safety in NASCAR
- Randy La Joie – Safer Racer
- Dr Robert Hubbard – HANS history and Development
- Trevor Ashline – Dynamic Occupant Systems – Tomorrow's Technology
- Joe Marko – The Science of Seat Belt Installation
- Dan Thomas – Snell and Crash Helmets
- Arnie Kuhns – SEMA Foundation Inc. (SFI) – The Driving Force Behind Motorsports Safety
- Dr Terry Trammell – Head and Neck Restraints: What They Do and What They Don't

The main thrust of the conference involved driver safety and the advances that have been made in an effort to make every driver's working environment as safe as possible.

A major theme concentrated on the dangers associated with large immovable objects like concrete walls versus the impact absorbing crash barrier fencing which is designed to slow down the rapid accelerations of a crashing vehicle. With the emphasis on spectator safety, which is obviously of paramount importance, concrete and steel structures have been the norm, but this brought about a certain amount of danger when a driver was unfortunate enough to strike these barriers, sometimes resulting in major injury, or at other times even fatalities.

Extensive investigations into many injuries resulting from various accidents at race meetings revealed some alarming similarities. It was revealed that the force generated by body movements once the vehicle has been slowed so rapidly, caused sufficient head trauma that the end result was often fatal. Many injuries were as a result of badly designed or badly fitting helmets with most fatalities caused by a medical condition known as basilar skull fracture.

Developments over the last 10 years have focused on two main areas in an effort to improve the drivers' chances of surviving a major impact:

1. The first is improving the impact performance of crash barrier fencing by using energy absorption technologies to actually slow the deceleration rate of the vehicle and absorb some of the G-force; thereby, drastically decreasing the amount of kinetic energy transferred through the driver's body and particularly the driver's head.

   One example, the Steel And Foam Energy Reduction (SAFER) barrier, of energy absorbing crash barrier is shown below left.

A SAFER barrier installed at the Milwaukee Mile. Photo courtesy of Wikipedia.

HANS (Head and Neck Support) device. Photo courtesy of Wikipedia.

2. The second area is to actually control or limit the total amount of movement possible for the driver's head by the use of a HANS device (above right).

   1. HANS device
   2. Tether (one per side)
   3. Helmet anchor (one per side)
   4. Shoulder support

While these two general topics seemed to dominate the seminar some speakers touched on other important subjects such as seat design, seat belt design and fitting, safety and fire management strategies all aimed at improving the safety of race drivers, pit crew in general and racetrack officials.

With the exception of the SAFER barrier, all of these initiatives are widely used here in Australia, so it was heartening that our efforts compare positively to those adopted in the USA.

The IMIS Trade Show

2009 was the inaugural year for the IMIS trade show. A show largely brought about by increased demand in the region and the lack of a suitable trade show forum since the relocation of the PRI show to Orlando some six years earlier. Unfortunately, it was forbidden to take photos on the show floor, so the Fellow was not able to include any in this report.

Considering this was the first trade show for the organisers of this event, it was a definite success; no empty display booths, large crowds, and the people the Fellow spoke with, considered it to be a huge success. As an adjunct to the show, and in an effort to give attendees even more value, there were a number of seminars available to those interested in specific topic areas.

Indiana University-Purdue University Indianapolis (IUPUI)

A visit to IUPUI was undertaken to get an insight into their motorsports program and to view their facility. Pete Hylton, the program director gave the Fellow a quick run-down on their program.

IUPUI currently run two different programs:

1. A four-year Degree in Motorsports Engineering, which aims to prepare graduates for careers in the motorsports industry and automotive-related companies. This course focuses on teaching the fundamentals of engineering with hands-on projects that involve analysing, designing, and building actual automotive systems.
2. Certificate in Motorsport Studies, which has appeal to students who have a general interest in motorsports studies as related to Liberal Arts disciplines. Students interested in the history of motorsports, women in motorsports, race and ethnicity and motorsports, and the economics of motorsports, all benefit from this certificate program.

This second course was barely one year old when the Fellow visited, and was still in the development stage (shown below).

IUPUI workshop facility – very much in the development phase

Fellowship Activities – Florida, USA

The Fellow then travelled to Orlando, Florida, for the second location identified on the itinerary. The two events planned at this location were the Motorsports Business Forum (MBF) and the Performance Racing Industry (PRI) tradeshow.

The Motorsports Business Forum (MBF)

The two-day forum commenced on Tuesday 8 December, with no less than 25 quality speakers for the day, from all areas of the motorsport spectrum. Broad topics opened with the state of the industry, then marketing of the motorsports passion to the masses, and the challenge of team ownership in uncertain times. The lunch break was supplemented by a speech by Bobby Rahal, during which he promoted a new racing category, and the day ended with a session for event promoters and how to 'build the show'.

Wednesday December 9 included another impressive line up of industry experts to relay their wisdom in all things motorsport. Twenty-five speakers for the day addressed issues such as sponsorship opportunities, and how to build on those relationships, return on investment from a sponsor's viewpoint and the position of motorsports within the entertainment industry.

During lunch on this day an interview was conducted between conference chairman Zak Brown and the 'first lady' of NASCAR Lesa France Kennedy, CEO of the International Speedway Corporation was conducted. The phenomenon of the NASCAR brand was founded by France Kennedy's grandfather Bill France Sr. in the late 1940s. Most of the audience seemed captivated by this seemingly impromptu interview in which France Kennedy spoke of her involvement in the family business (NASCAR), currently the second highest ranked sport in the USA.

There were quite a few lessons to be learnt from the two-day forum with so many professional people from such a diverse range of companies, all prepared to spend time in an effort to not only inform, but to re-energise those attendees who have been quite rightly feeling the pinch due to the GFC. The optimism generated over those two days was noticeable, and all who attended were very positive about the experience.

The Performance Racing Industry (PRI) Tradeshow

For five years the Fellow has heard this trade show described as 'the motorsport shows to end all motorsport shows'. The Fellow found the actual trade show overwhelming in a positive way. Nothing, in the Fellow's opinion, can prepare new attendees for what is witnessed from the moment they enter the show floor. As far as the eye can see, there are nothing but trade stalls dedicated to the motorsport industry and its practitioners.

Everything from the smallest two dollar component (the ones that seem to fail so regularly and spoil the chance of a race finish), right through to the million dollar equipment that seems to be a part of even small race teams in America, was on display.

It was extremely difficult to follow a set program as the Fellow found there were many distractions in the form of all the informative and interesting people and organisations available. It was apparent right from the outset that with just three days available, one was going to need a reasonably rigid schedule to take it all in. Part of the Fellow's charter in undertaking this fact-finding mission was to make contact with the training organisations that conduct motorsports programs, identified prior to departure from Australia. At PRI, every time the Fellow uncovered a new educational facility, there was another to investigate, making it impossible to interview them all.

The Fellow's three-day investigations and interviews at this show identified considerable repetition from various suppliers, and a lack of products displaying huge leaps forward in either safety or technology.

Access to the Internet, increase in foreign trade and the advancements made in freight methods have truly made the world so much smaller, whereby, approximately 90% of the items seen on display, we already have available, right here in Australia.

However, it was at the Motorsports Business Forum and PRI show where the Fellow witnessed for the first time, any hint of sustainability in motorsports of any description, in America. Following these very busy and informative three days, the Fellow then moved to Charlotte in North Carolina.

Fellowship Activities – North Carolina, USA

The Charlotte Regional Partnership publishes various statistics regarding the Charlotte area that put the economic importance of the Automotive Racing industry into perspective (http://charlotteusa.com/).

- Motorsports is a US$6 billion industry in North Carolina.
- National motorsports events include:
  – Coca Cola 600
  – NASCAR's All Star Challenge
  – Bank of America 500
- More than 400 businesses and a skilled workforce support motorsports of all kinds, including go-karting, drag racing and American Le Mans format.
- Related facilities include market-leading wind tunnels providing accurate aerodynamic testing.
- Charlotte is home to NASCAR's Research and Development Site, which houses rules officials, corporate officers, accident investigators, and directors of the three official NASCAR series.
- Location of the Richard Petty Driving Experience, one of the largest motorsports-related driving schools in the USA.

The tight schedule called for a visit of just four days. During this time the Fellow had planned to visit two educational facilities offering a motorsports program and at least one racecar shop that prepares cars for Marcos Ambrose, the Australian driver currently racing in the USA. The Charlotte area would have to be the mecca for motorsports.

Michael Waltrip Racing (MWR)

The Fellow drove from Charlotte to Cornelius, approximately 20 miles north. The planned visits included Michael Waltrip's Raceworld USA, which had once seen duty as a picture theatre complex, where he was fortunate enough to be taken on a tour of the workshop floor and got to see the 'behind the scenes' picture that most visitors wouldn't ordinarily see.

MWR's impressive facility once saw duty as a picture theatre

A small portion of the MWR race workshop

Another shot at MWR from the workshop floor

To put this facility into perspective direct comparisons need to be made between the two countries and their premier race categories need to be highlighted:

- MWR employs some 220 people across their facility.
  – A 'large' team in Australia would employ around 50–60 people.
- Major sponsors for a NASCAR team pay around US$30 million per year.
  – Australian major sponsorship deals would be in the region of A$5–10 million per year.
- MWR competes in 35–40 races per year.
  – Australian teams compete in 15 races per year.
- Normal working hours for most of the MWR team are 8.5 hours per day with any overtime being unusual unless something has gone wrong.
  – Australian teams can be required to work anywhere between 8 to 16 hours per day depending on the time available to 'turn the car around' (race slang for making the car ready for the next race).
- MWR can have up to 15 cars per team to cater for the different circuits they attend. With three in-house race teams there are 45 cars in total to be housed or worked on at any one time.
  – Depending on the number of cars in the team, Australian teams are lucky to have one spare car, two if they are very lucky, and their primary racecar is called upon to race at all the tracks they attend.

The Fellow was lucky enough to be able to spend an hour with Nick Hughes, an ex-pat Australian now working for MWR as the Director of Engineering. Hughes was able to give an insight into the workings of MWR, and NASCAR in general. It would appear that while it may be difficult, it is not impossible for Australian workers to find their way into one of the largest and most popular motorsport categories in the world.

Performance Instruction and Training (PIT)

Next stop on the agenda was a visit to PIT, located approximately 30 miles north of Charlotte, in Mooresville. This privately owned US$10 million purpose-built facility opened in 2001 and caters specifically for those crew members who work in NASCAR and operate in the pit road environment as part of the 'over the wall' crew.

Because of the nature of the working environment and the requirements for NASCAR when compared to our V8 Supercars, the fitness training that forms a large part of their training program is akin to the approach adopted by any professional athlete. So much so that students are encouraged to work out with professional trainers, in the fully equipped gymnasium as often as they can.

PIT conduct two different training programs – one is an introductory course that takes place over a two-month period and the other is a more concentrated course intended to fully hone those skills required to succeed in the ultra competitive NASCAR environment. This second course called 5 Off 5 On is only available to those who show the aptitude required to excel in the industry. Graduates of the program, like many here in Australia, have gone on to advance their careers further, once they have gained that all important 'foothold' within the industry.

PIT also conduct many activities away from the racetrack, but these activities still have that race team focus. Bob Plott was the tour guide for the day and the Fellow is extremely grateful for the time that he was able to share and for the insight into their program.

North Carolina Auto Racing Hall of Fame

The Auto Racing Hall of Fame located in Mooresville depicts the history of auto racing from the days of running moonshine, through to cars from more recent categories.

The visit begins with a video from their extensive collection showing the history of motorsport in the USA. From there you learn of the history associated with man and machine in their conquest for fame and fortune through ever increasing speed.

Reflecting the considerable attention the motor racing industry receives in the USA, colourful characters like Richard Petty, Cale Yarborough, A.J. Foyt, Darrell Waltrip, Dale Earnhardt and Smokey Yunick were featured regularly at the North Carolina Auto Racing Hall of Fame and were never far from mind during the visit. America has embraced their rich motor sport heritage in a way not often matched here in Australia. Having said that, the Bathurst Motor Racing Museum is doing an excellent job. Given the renewed interest in the history of local motorsport activity in Australia, it is only a matter of time before we see some formal recognition of motorsport in this country.

Penske Racing

An unplanned visit to the workshop facility of Penske Racing was added to the agenda as we before the return journey to Charlotte that evening.

After purchasing this property in June 2004, it took almost two years to refurbish and fit out this new workshop, with Penske Racing's NASCAR division moving their operations in by March 2006.

Roger Penske reportedly manages this organisation with an almost military type approach. His philosophy of 'performance paired with style' is evident from the moment you walk into the spacious reception/display/merchandise area. Cleanliness is quite obviously a priority, as demonstrated by the receptionist dusting the cars and display goods whilst chatting about the facility and team in general.

A quick walk upstairs to the elevated walkway that flanks one side of the shop and gives visitors a birds-eye view of the daily operations below, and reveals Penske's vision of perfection.

This vision translated to liberal amounts of space, complete with Italian floor tiles (easily cleaned and replaced if damaged), where the team members can go about their duties with comfort and commitment. Penske has been quoted as saying that, *"The tremendous work environment it provides for all Penske Racing employees is conducive to peak performance".*

Caption: Penske's approach is evident with the Italian floor tiles on the workshop floor

A workshop to be proud of – unparalleled in Australia

This approach to race shop facilities has many benefits, some that can be measured quite easily and others that cannot. It takes a person with courage and conviction to make such an investment. The payback would come in increased sponsorship possibilities, increased employee satisfaction that would lead to good employee retention, and an increase in fan base and activity. All of which would lead to a more economically sustainable automotive race organisation.

Winston Salem State University (WSSU)

Two friendly academics the Fellow met at the PRI tradeshow invited him to visit their facility at Winston Salem State University (WSSU) where they conduct a Motorsport Management program. This program consists of four years of study and is aimed at preparing the graduate for a management role within the industry.

WSSU is referred to as the only 'historically black college and university' and is using their Motorsports Management program to compliment the Drive for Diversity program initiated by NASCAR.

Details of the WSSU program can be found by referencing the following website:
http://www.wssu.edu/WSSU/UndergraduateStudies/School+of+Education/Department+of+Human+Performance+and+Sport+Sciences/Undergraduate+Programs/Motorsport+Management/Motorsports+Home

Details of NASCAR drive for diversity can be found by referencing the following website:
http://drivefordiversity.info/content/

The motorsport teachers at WSSU have been relocated to an office attached to the famous Bowman Gray Stadium, a quarter-mile asphalt oval, which is the longest running weekly NASCAR sanctioned track in the country.

Access to this facility and the fact that events are conducted on a weekly basis once racing season begins, gives the students at WSSU a unique opportunity to practise their craft on a regular basis. While the WSSU program concentrates on the management aspects of the sport, the practical hands-on side isn't explored to its full extent. This is where most of the motorsport programs in the USA and Australia seem to differ.

Roehrig Engineering

Roehrig Engineering is a manufacturer of world leading damper (mistakenly called ‘shock absorber’ by those less informed) dynamometer testing machines. Being an American manufacturer means that most race teams in the USA use these Roehrig damper dynamometers. Not being restricted to the USA in a global marketplace means that there are quite a few machines that make it to export every year around the world.

Making a move from their older ‘crank dyno’ style machine, Roehrig have invested much research and development in developing an electromagnetic style dynamometer capable of simulating the actual racetrack running conditions for dampers. This gives teams the added advantage of using real-time suspension movement data to accurately simulate the operating conditions of this most important suspension component.

While in itself it is not the be all and end all of tools that will magically give the race mechanic all the answers, it is yet another development of what is fast becoming a must-have tool for those seeking the extra tenths of a second over their opposition.

It’s a race for lunchtime at Roehrig Engineering

University of North Carolina (UNC) Charlotte

Later that day the Fellow visited the University of North Carolina (UNC) Charlotte. UNC Charlotte conducts a four-year motorsports program that ranges from engineering to marketing. As witnessed during this visit, it would appear that UNC Charlotte places a lot of importance on the hands-on practical skills that come with working in the motorsports industry.

As part of the normal operation at UNC Charlotte, students from other streams of study are encouraged to participate in the motorsports program where applicable, to further enhance and broaden their own field of study.

The facility at UNC Charlotte was comparable to the earlier times at MTA where space was very much at a premium, and even though this was newly constructed (reportedly at a cost of US$1.8 million), conditions seemed quite cramped with seemingly insufficient workshop floor space for a training environment.

A view of the workshop facility at UNC

The Fellow managed half an hour with the UNC Motorsport Laboratory Manager, Luke Woroniecki, until preparations for a planned trade celebration took priority, and it was left to a student to show him around other areas of the facility. This included the general areas and the Computer Numerically Controlled (CNC) machining rooms.

One thing that immediately caught the Fellow’s attention was the lack of safety guarding on some of the machines in the training room. Although the Fellow is not familiar with OHS regulations in the USA he knows that in Australia, this would be unacceptable for a training environment.

Conclusion

The opportunity to attend not one, but two, motorsport-specific trade shows conducted in the one country within a week of each other enabled the Fellow to gain an understanding of the automotive racing industry in the USA.

In planning his itinerary, the Fellow believed the best place to see the current advances in technology, safety and sustainability in the motor racing industry would be these motorsport tradeshows. In practice, perhaps this was not quite so, as the Fellow was reasonably well aware of most of the products and information on display already.

In fact, it would appear that in an effort to keep costs down in the realm of the average American motorsport participant, there is a definite reluctance to adopt new technologies. This leaves the Australian industry clearly in the lead in many areas.

Of most benefit were the visits to the various race team facilities, the chance meetings with enthusiastic people from various teaching organisations and the discussions with trade show stall holders on general subjects concerning the motorsports industry.

Visiting professional race workshops also gave an insight into their involvement in the industry, the size and scope of which we will never see in this country.

The various contacts made, the experiences shared, will place the Fellow in good stead not only to share this knowledge with other educators in this area, but also to assist in the development of future motorsport training programs that will have a broader appeal and cater for a more diverse range of programs than currently available anywhere in Australia. This is to ensure that the skills and knowledge gained during the Fellowship are used to address any existing deficiencies and to ensure that the V8 Supercar franchise in Australia remains financially and environmentally viable for the future.

Knowledge Transfer: Applying the Outcomes

State and Size of the Industry

North America (excluding Alaska) occupies roughly the same land mass as Australia but exceeds the Australian population by over 14 times (311 million compared to 22 million).

A map showing that North America (excluding Alaska) occupies roughly the same land mass as Australia

With such a discrepancy it appears that Australia could never come close to replicating the demands for products or services that extend from exposure to such a large population base. This difference also impacts the training services available to the industry.

Currently, the traditional Australian publicly funded TAFE system is undergoing change, with more support being given to the private Registered Training Organisations (RTOs). Changes to funding models and the various changes being instigated by the government look likely to strengthen those training organisations strong enough to fully support educational programs.

While Australia appears to have emerged relatively well from the economic environment resulting from the GFC, educational institutions involved with the motorsport industry would have noticed that any real advancement in both education and the industry addressing identified skills deficiencies in the last 12 months is minimal. Most race teams have struggled to remain afloat, let alone make any realistic financial gains sufficient enough to develop or support new training programs.

Use of Technology for Safety, Sustainability and Green Initiatives

One of the focal points for this Fellowship was to seek out examples of new technology being used to advance the industry in the areas of safety, sustainability and green initiatives, and to investigate new products or services. The Fellow was surprised by the fact that there didn't appear to be any great advances that weren't already known in Australia, or in use.

NASCAR dominates the industry in the USA and V8 Supercars dominates in Australia, and this will give an insight into why the expected new developments weren't evident.

One of the biggest differences between the two racing disciplines is the fact that NASCAR is predominately conducted on a circular or oval racetrack, with the occasional road course included, and has been around since the late 1940s with only minor alterations to the basic formula introduced by Bill France Snr many years ago.

In comparison, Australia's V8 Supercars has its roots in the Australian Touring Car Championship (ATCC), which conducted its first race in 1960, 13 years behind the USA. Just like the USA, the vehicles that formed the basis for the ATCC were basically production-based vehicles of all different makes. Australia experienced a gradual evolution as in the USA with continual improvements for safety, vehicle aerodynamics and vehicle dynamics. The series survived into the 1990s when the newly formed Australian Vee Eight Supercar Company (AVESCO) stepped in and began the transition to the current format that is Australia's premier motor racing category.

V8 Supercars have reached a similar point to the USA equivalent, in that the current crop of racecars bear very little resemblance to their road going counterparts. But, unlike the USA, the current Australian formula only very loosely follows the original concept. We are now set to embark on a similar path to the USA with our own Car Of The Future (CotF).

With very little change to the basic layout, even the current NASCAR still uses components that have changed very little over the past two decades, choosing to run a carburettor and fossil-based fuels. Conversely, while the Australian V8 Supercar has utilised similar mechanical components to NASCAR, they have run fuel injection instead of carburettors since the introduction of the newly formed category in the late 1990s. There have been many changes to the fuel injection system itself over the years, with the latest change being the shift to ethanol-based E85 fuel. NASCAR has only recently been talking of finally introducing fuel injection to their category.

The newly constructed CotF will employ other technological changes, which will represent a major shift in relation to safety, suspension design, engine choices and the opportunity for other manufacturers to enter the series.

Safety

Traditionally, the world of motorsport hasn't been the safest of places in which to work or compete; in both counties, we have had our fair share of injuries or fatalities. In more recent times in Australia, instances of major injury or fatalities have been few and far between. The few incidents that have occurred in the last few years have usually resulted in some kind of improvement to the vehicles to prevent a recurrence.

In the USA, on the other hand, it was reported to the Fellow that there have probably been more major injuries and deaths in pit road, than there has been on the track. This has been largely anecdotal and unsubstantiated with readily obtainable data, but from personal observation it could be true, as a lot of the permanent ovals in the USA appear to have largely unprotected and exposed pit road areas in which the teams must operate. The Fellow is now aware that changes are being made at most circuits to offer more protection in this vulnerable area.

In both countries, changes have been made to the regulations to provide a safer environment for those who work on the cars during pit activity; this has certainly paid dividends and now incurs heavy penalties for any team found not to be complying. This has begun a culture of safer work practices and an understanding of duty of care.

From a driver's perspective one of the biggest life saving improvements has been the development of the HANS device (as described previously in this report). Now compulsory wear in nearly every category, this device has the potential to be the single most important life saving device for drivers.

Knowledge Transfer: Applying the Outcomes

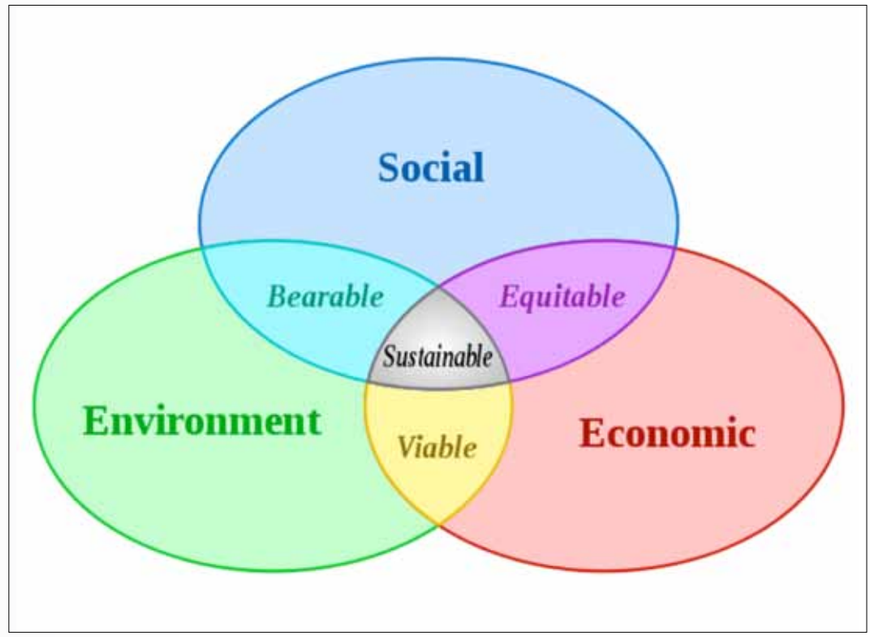
Other less significant improvements that are equally important for drivers include protection in case of fire, including PPE clothing and fire suppression devices.

In the area of crash protection, the USA has different requirements than Australia. In the USA where most racing is conducted on oval tracks, most incidents involve the vehicles striking the outside wall at a fairly acute angle, with more of a glancing blow, than being struck head on. With this in mind any effects can be very much reduced if the energy from the impact can be absorbed and not fed back into the vehicle. This has been accomplished in various ways, with various degrees of success over the years. It appears that the developers of the SAFER barrier have struck on a successful formula, with most tracks in the USA now employing the technology.

By comparison, in Australia, due to the fact that V8 Supercar racing is conducted on permanent road race circuits, usually with plenty of run-off, or temporary street circuits, the SAFER barrier hasn't been adopted. Another problem in Australia is that due to the lengths of the circuits involved with the road or street racing conducted locally and given the many different combinations of possible collisions, it would be cost prohibitive to fit a SAFER barrier to the entire length of the circuit. However, there would be certain areas of the circuits where it would certainly work very well.

Sustainability

Sustainability can be seen as the capacity to endure. This of course has many far reaching connotations, other than environmental, to include aspects of social and economic sustainability, with all aspects being intertwined (as evident in the following figure). Changes in any one area are likely to have a knock-on effect on the others.



Scheme of sustainable development. Diagram courtesy of Wikipedia.

With the introduction of the CotF and the CoT, it is no strange coincidence that both Australia and the USA are citing improvements in safety and lowering operating costs in an effort to keep the categories alive and remaining financially, socially and environmentally sustainable, and providing good competitive action well into the foreseeable future.

If this industry is to not only survive, but also prosper, sustainability will have to play a large role in the operations of each end every motorsports team. Motorsport controlling bodies, category managers and teams alike will have to introduce and adopt new processes to keep the issues of sustainability at the forefront of this industry, much like they have done with the safety message. Obviously, this isn't going to be an overnight instant change, with much of the change process being driven by graduates of motorsport training programs. This will have implications and present opportunities to those training organisations strong enough to adapt to the rigours of the new regulations.

Recommendations

Government

- Due to a respect and compliance with self-regulation within the industry, government intervention is not recommended nor needed, excepting the Commonwealth or State legislative or legal requirements such as health, safety and environmental regulations.
- In Australia, the Commonwealth Government and State Governments should offer more assistance to businesses involved with permanent racing facilities in an effort to remove the hoon element from the street, promote safer and more competent drivers, while giving the industry some much needed assistance to move the industry to the next level.

Industry

- From the Fellow's experience in the USA American race teams have a much larger involvement with development of the curricula of selected training programs, and taking students for internships during their summer break. As outlined during interviews with various race teams there appear to be concerns about the real value of some internships.
- Race teams in the Australian motorsport industry need to get behind any locally available training organisations and support them in any way possible. One of the biggest areas of support actually comes from a work placement arrangement; whereby, students get hands-on experience working with a race team either at the workshop or during an event. To cite a locally-based team for MTA (Brad Jones Racing, Albury, NSW, Australia), *"This gives us the opportunity to check out potential future employees without the problems associated with the employment process, and at a very small cost".* In effect, it is an investment in the future of the team and the future of the industry.
- Long lasting, mutually beneficial relationships need to be fostered between industry and training organisations. This will require commitment on both sides of the fence with a common goal in mind.
- There needs to be some major investment in new facilities and infrastructure to enable Australia to host truly international events and showcase on the international stage if the motorsports industry is to move to the next level.
- Working with local training providers to develop subject-specific courses for the motorsports employee.

Education and Training

- Training organisations need to constantly monitor the state of the industry to ensure that their programs meet current industry best practice.
- New areas of study need to be developed, particularly in the field of sustainability.
- While the demand for a Diploma of Motorsport at Wodonga Institute of TAFE (that concentrates largely on management subjects) seems quite low in Australia at this current time, course structure and content needs continued investment and development in preparation for the inevitable demand to come.
- Australian (and American for that matter) educational controlling bodies need to ensure that all training conducted under the guise of a motorsports program, is nationally recognised. This is already largely the case, with Australia adopting nationally recognised training packages. While it would be a mammoth task, I am sure the USA would benefit greatly by adopting a similar format.
- The new regulations around training program certification (mainly in the Australian state of Victoria) can only be a good thing, with the likelihood of having any training providers who can't measure up to the task being removed from the training landscape. This is a procedure that other states should consider.

- Training providers need to develop a way of delivering training to those people already involved with the industry to formally recognise their qualifications and experience, without having to interrupt their normal routine. This could be facilitated via online or other flexible delivery arrangements.
- Targeted, subject-specific courses need to be developed in conjunction with industry.

Controlling Bodies

- Motorsport controlling bodies must recognise the vital part that motorsports industry training provides and take an active interest in training providers working in this industry sector.
- The introduction of regulations covering at all aspects of sustainability are required, albeit with consideration of existing practices and to ensure no negative reaction from those involved in the industry.
- Motorsports industry bodies need to be involved in the development of a process for training in the areas of officiating, scrutineering and marshalling, in cooperation with members of the industry and training providers.

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Attachments

As stated earlier in this report, part of the overseas research conducted during this Fellowship enabled Clissold to interview three of the most influential leaders of the American NASCAR racing industry. The questions asked, and the individual's responses and comments were summarised previously in the 'Identifying the Skills Deficiencies' Chapter of this report. They are outlined in more detail in the following attachments.

Discussion on Skills Deficiencies

Differentiate the Factors Related to Trend Analysis Pertaining to the Australian Motorsport Industry

Who controls motorsport in your country? Is there one controlling body, or are there different controlling bodies for different forms of motorsport?

Motorsport in the US is controlled by the Automobile Competition Committee for the United States (ACCUS). This body serves as the interface between the Federation Internationale de l'Automobile (FIA) and its member clubs in the US, comprising eight sanctioning organisations: NASCAR, National Hot Rod Association (NHRA), Grand American Road Racing Association (Grand Am), Indy Racing League (IRL), United States Auto Club (USAC), Sports Car Club of America (SCCA), International Motor Sports Association (IMSA).

ACCUS appears to be the equivalent of the Confederation of Australian Motorsport (CAMS) here in Australia, with both bodies being the FIA delegated National Sporting Authority (NSA) for their respective countries. Details of the core purpose and responsibilities can be found at the following websites:

- http://www.cams.com.au/en/About/Our%20Core%20Purpose.aspx
- http://www.accusfia.us/

From this point of reference it would be logical to think that the 'basic' competition rules would be very similar between the two countries. It would only be the application and conformity through the homologation process that would differ between racing categories.

In Australia, cost containment and the need to reduce any parity arguments led to the development of 'Operation Blueprint'; a move to standardise the two competitors in the Ford versus GM battle. This move has seen our V8 Supercars become increasingly similar to the American NASCAR. In an attempt to reduce the competitors' costs even further, V8 Supercars has embarked on the 'Car of The Future' project, which a lot of people are comparing to the NASCAR 'Car of Tomorrow'. This project aims to reduce the overall build cost of a car to around A$250,000.00 and ultimately make the cars safer for drivers.

What is the average build cost of a current NASCAR?

It would appear that it is just as difficult to obtain the cost of construction of a current NASCAR, as it is to obtain an accurate cost for a current Australian V8 Supercar, with no factual figures available due to teams not willing to disclose certain financial details. The introduction of the Car of Tomorrow (CoT) in the USA has reportedly increased costs to teams through tighter controls on body specifications and teams having to build completely new vehicles.

This appears to be a short-term problem with most teams admitting; other than the initial outlay, the cost savings with the decreased requirements for research and development will deliver significant savings. Within the premier racing category, (NASCAR), there is a large disparity that still exists between high and low budget teams with respect to the number of vehicles they can afford to build. This has been slightly alleviated by the fact that there should be less total number of cars required to cater for different tracks due to development of the CoT.

Comment from the Fellow:

"The V8 Supercars competition in Australia is now well down the track to finalising the build of the first Car of the Future (CotF) with Peter Ceprnich and the Pace Innovations company having completed most of the work on the basic chassis as of October 2010."

Has there been a similar evolution in the USA as there has been in Australia with the cars or category rules?

For NASCAR the CoT has been the biggest evolution in modern times. Introduced for all the right reasons, the full intentions weren't realised with the implementation. In their valiant efforts to do the best by all parties, NASCAR has actually failed on a couple of counts:

- Development of the new car has initially increased costs to the teams.
- Changes to the engine in the way of air intake restrictors and aerodynamics of the vehicles has created such close racing that the potential for disaster has actually increased; presumably the increased safety aspects of the design will increase the drivers' chance of survival.
- The CoT has further distanced the current NASCAR from the showroom models and runs the risk of losing a percentage of the fan base.
- Since the introduction of the CoT was within the last two years, it is still too early to tell whether it has been widely accepted.

Comment from the Fellow:

"We could learn a lot in Australia from studying the development, progression and implementation of the CoT."

The real reason for the success of the sport needs to be remembered—good entertainment with close, competitive racing—is there any correct answer?

To what extent has the adoption of new technologies informed the development of the current NASCAR?

Other than in development of the CoT, NASCAR appears to have deliberately kept development the mechanical components of vehicles low key to curtail costs, and remove areas where teams could gain large competitive advantage. This hasn't necessarily stopped teams spending money in areas that are not obvious to the casual observer in an effort to gain extra speed or cut down lap times.

A lot of time and money however has been spent on safety using new car construction methods and technologies in an effort to increase driver safety.

Interestingly, there has been talk for some time now of NASCAR adopting fuel injection in place of the age old carburettor in an effort to make use of current ethanol blended fuels and improve fuel economy, engine reliability and life span.

The Fellow believes that his is one area where the Australian V8 Supercar is well advanced over its USA counterpart.

Is there a main area of focus by teams in an effort to gain that competitive advantage?

With the changes to the current NASCAR racecars and regulations, any real areas of development have been removed. Race teams are always searching for the change that will deliver some kind of competitive advantage. With a decrease in track testing opportunities, efforts are focused on areas where incremental gains may be found without having the vehicle leave the workshop. To find that competitive advantage is now harder and more costly.

Previous NASCAR rules allowed for various freedoms in areas that could be seen, dissected and discussed by the press and spectators alike. This created interest in the teams and their cars, people would follow a teams' progress to gauge whether any changes resulted in genuine gains on the track. With the advent of the CoT those freedoms are no longer entirely visible, so that area of interest and discussion is now lost.

An old adage that seems to be losing credibility due to the similarity of Ford and Holden in V8 Supercars is 'Win on Sunday, sell on Monday'. Does that adage hold true in the USA?

It used to hold true, a manufacturer that had success on the racetrack could expect higher than normal car sales enquiries the following week. Manufacturers were well aware of the advertising advantage to be realised by winning major race events. Manufacturer 'race bred' specials were nothing new, with many models being produced every year in sufficient numbers to satisfy homologation requirements.

In typical folklore fashion, it seems that both in Australia and the US stories of special lightweight body panels being pressed at the factories, distributed to only 'favoured' teams and used selectively on vehicles capable of winning races and championships abound.

Coupled with the financial crisis that car companies have faced, loss of identity with current road-going versions is cited as the possible cause for the demise of that old adage. For whatever reason, it certainly doesn't hold as true, and the hype that was created once upon a time has all but disappeared. Nowadays supporters are encouraged to follow the drivers rather than the manufacturers.

If NASCAR did not exist, what do you see as being the premier racing category in the USA?

As long as there are modes of transport for the masses sold by different manufacturers, there will be stock car racing in the US and some form of production vehicle based racing in Australia. If NASCAR was to disappear it seems to be accepted that open wheeler racing (more particularly Indy Car) would be the most popular form of motor racing.

The ongoing success of any particular category being touted as that country's 'premier' racing series depends largely on the appeal to the 'average' race fan. Lose that appeal and face the consequences.

Can you see any other forms of motorsport or racing categories on the horizon as 'the next big thing in motorsport'?

There doesn't appear to be any one particular item on the horizon that could be identified as 'the next big thing' in US motorsport. According to Kim Green, *"There is a definite interest in racing cars utilising alternative fuels"*. This is an area of development that needs a lot of attention according to various respondents, but isn't receiving anywhere near enough consideration at this point in time.

Bruce Ashmore indicated that the Gold Crown Championship may well be the next big thing, but admits that thought may be slightly biased. Bruce is the designer of a new open wheeler racecar that bears a resemblance to the speedway cars of the past, with a 21st century remake, which it is hoped will be a success in its first year of competition – 2011.

Can you briefly describe any 'homologation process' that is in place in NASCAR?

Bruce Ashmore stated response was, *"NASCAR adopts a very stringent rule package. To be eligible for entry into a NASCAR event each component of the car and all its variants must be submitted by the various manufacturers for inspection by NASCAR officials at the NASCAR tech centre. These examples are displayed at the technical centre for competitors and officials to view. Any component found at the track where an example hasn't been lodged at the technical centre is instantly banned from competition. This process brings officials, team members and other manufacturers into the policing/ scrutinising process. In this way everyone involved with the category gets a say in the process of ensuring compliance with the regulations".* Ashmore further suggests, "*This system is definitely worth consideration by any other sanctioning body".*

Analyse and Record Information Pertaining to Advances in Safety Practices

- Evaluate advancements in safety management and safe working practices
- Identify individual areas of improvement in relation to:
  – driver and pit crew apparel
  – car servicing methods and technologies
  – course layout
  – local work area/pit bay layout
  – training
  – fatigue management
  – communication
  – safe working practices.

How important is training for pit crew safety, given that the USA is continuously reported as being such a highly litigious society?

- Tom Weisenbach stated, *"Safety should be the most important part of any race".*
- Bruce Ashmore agreed and added, *"Very important".*
- Kim Green stated, *"Training is critical for the competition side – speed and execution is everything in a pit stop and often the pit stop wins races".*

There appears no doubt that safety has become a subject of close scrutiny and high importance. Many training programs have sprung up to meet the demands for training crew members to professional athlete type levels. So much so, that many ex-athletes have moved to NASCAR in particular, because pit stops have become increasingly important in deciding the outcome of races. The pit lane area is inherently a very dangerous place to be as there are so many variables to be managed and so many different possibilities for disaster to strike.

In preparation for working in such an environment it is important that those who offer training make every effort to ready the potential crew member for all situations that may eventuate.

Can you briefly describe the safety or Personal Protective Equipment (PPE) clothing required for both driver and pit crew in relation to safety?

As stated previously driver safety has been vastly improved with the redesign and introduction of the CoT in NASCAR. To make a difficult job even more difficult, the driver must endure long stints at the wheel in a very compact environment wearing fire resistant Nomex race suits, underwear and socks, and a Nomex head sock or balaclava. This creates what would have to arguably be the harshest working environment, to the point where drivers are often in danger of collapse from the effects of heat exhaustion and dehydration.

In an effort to keep the valuable pit crew members safe in the unlikely event of an incident, they are required to wear protective clothing almost equal to that of the car driver. This being: fire retardant suit, gloves, shoes and helmet. This requirement makes the actions of the pit crew a little more difficult and further increases the importance of proper training.

It was suggested that in NASCAR there were more fatalities in the pits than on the track. This statement, whilst unsupported by any hard facts, seems quite plausible considering the proximity to the racing surface and largely unprotected nature of the pit road at some of the regular racetracks in the USA.

By comparison the incidence of major injuries or fatalities in Australia would be very small when expressed as a percentage of the total number involved.

Effective and safe management of pit stops during a race has always appeared to be a problem in Australia and in the USA. What changes have been made to increase the efficiency and safety of pit lane servicing?

No driver wants to spend time off the track; time in the pits equates to time not spent racing, and can destroy any chance of a reasonable finish. This poses problems for team management and race officials alike:

- From the drivers point of view, they want to get into and out of the pits as quickly as possible – in an effort to lose as little racing time as possible and therefore give away track position. This thirst for success has created its fair share of problems and near misses at many a race meeting.
- From the team management point of view, while it would always be nice to win, it is not worth the fines or risks associated with dangerous or illegal pit entry (or exit). Penalties imposed during the race by officials can soon destroy any chance of finishing in a winning position.
- From the mechanics point of view, pride in your work takes priority and being associated with a winning team is what every team member lives for. Remaining alive to take part in the next race is also high on the priority list.

Pit stops have become a critical part of race strategy; therefore, proper management is extremely important in the pursuit of a good race result. Compared to years gone by, the pit lane is a much safer environment.

Kim Green summed it up with the following statement, *"Over the last 10 years there have been rule introductions in the way of crew uniforms and helmets etc. that have drastically improved the safety for the crews along with the implementation of pit lane speed limits – which certainly were not in place when I was an over the wall pit crew member on the Indy Cars. It was quite the scene to have Indy Cars racing down pit lane and 200 mph plus speeds at some oval track – and less than five feet from my ankles as I was doing a pit stop!"*

Time is a good teacher, however, and lessons learnt from previous mishaps have seen the introduction of a number of initiatives in an effort to manage the risks associated with working in pit lane. These include: governing pit lane speeds, the number of people allowed over the wall, pit lane scrutiny by officials and changes to track design and safety equipment.

Have there been any significant advances in track layout or design to increase safety?

The single biggest innovation is the development of the Steel and Foam Energy Reduction (SAFER) barrier. This coupled with a redesign of the infield runoff areas have provided a much safer workplace for the drivers.

The adoption of the HANS device has increased a drivers' chance of survival should any unplanned incident happen.

Careful design of the pit lane area with respect to the following; pit wall being genuinely high and strong enough to contain a car in pit lane, longer pit lane to allow more room in individual pit boxes and a wide pit lane providing a running lane, an acceleration lane and a slow down lane, have all played a part in increasing safety in pit lane.

Comment from the Fellow:

"Other than the use of the SAFER barrier, in these and all other areas the Australian motorsports industry seems to be up to date."

Is there a set layout for the pit area, or does it differ from team to team?

What works well for one team and cuts down pit stop time quickly gets noticed and copied. In NASCAR as much as it is with V8 Supercars in Australia, any team that appears to gain an advantage from any change, no matter how minor, very quickly has that change duplicated. This can manifest itself in teams copying the equipment that another team uses, the process another team utilises, the layout of the pit area even down to duplicating the movements of crew members of other teams.

In the late 1990s it was realised that there was considerable time to be saved during the actual pit stop by properly orchestrating the movements of the crew members. Pit stops are now studied and performed in much the same way that a dance routine is choreographed to the most minor detail.

Do you prefer to train people 'in house' or do you look to training organisations such as 5 Off 5 On for new staff?

Within the motorsports industry both in Australia and the USA it appears that teams are looking for workers with at least a basic knowledge of the mechanics of a racecar and the willingness to learn. Kim Green confirmed this by stating, *"Basic knowledge of a job position is preferred and then we train the employee. This allows us to instil our procedures and philosophies on the employee".*

As in Australia, some teams do look towards training organisations as a source of supply for potential crew members. Most of the larger American NASCAR teams have their own pit lane coaches who deal specifically with the 'over the wall' crew.

Fatigue management is an issue with any race team, are there any particular methods you use for fatigue management?

In today's competitive motorsport environment as in any other team sports, team managers now employ their own specialists such as dieticians, sports trainers, chefs. Crew members normally undergo some kind of fitness training, particularly the 'over the wall' crew in NASCAR where athleticism is a distinct advantage. Well prepared meals and snacks are supplied by the teams' chef as part of the normal routine at race events to ensure capability and high performance of the team. Many teams even manage what the staff may eat at the race shop.

Sensible working hours at the race shop aids in managing fatigue as well with work days getting underway early but also finishing reasonably early, with 4.30 pm being the norm. Long days and weekends other than race weekends are kept to a bare minimum to allow team members to spend quality time with friends and family.

Can you give me a brief run down on the methods of communication in use, particularly during hectic pit activity?

Both countries seem to follow very similar processes in regards to communication. This consists of radio communication between driver and important crew members during racing activities; this can be to warn the driver of any hazards on the racetrack, problems with the vehicle and during pit stop activities. Signs and hand signals are also used during the actual pit stop by various crew members, particularly to indicate a problem during the stop.

Comprehensive team briefings are another form of communication that team managers use to initially ensure that all crew members are informed of their duties and expectations.

How would you rate the performance of most teams in the field of safety management and work practices?

Teams are constantly improving both attitude and action in the area of safety. As Bruce Ashmore states, *"You cannot afford to lose positions in the race or expensive highly trained personnel".*

In reality any involvement in motorsport is all about performance and winning races, but safety is an issue that cannot be ignored if teams are to have any chance of putting in consistent performances. Ashmore further states, *"A safe team is also a fast team and it is generally that team that wins the championship".*

The safety message isn't wasted on the team just for their benefit either, with spectator safety being a very high priority. Kim Green says of the Indy Car series, *"The Indy Car Series encourages and allows the fans to get close to the teams and drivers throughout an event so having well organised fan safety is critical".*

Any team that flouts safety does so at their peril. With the average spectator being so much better informed, any team who blatantly disregards the safety of crew members or spectators alike will at best soon lose valuable supporters of their team, or at worst suffer harsh penalties imposed by the governing bodies.

Analyse and Record Information Pertaining to Sustainability Initiatives and Practices

In a few words, what would you put forward as the biggest challenge or challenges to the motorsport industry on a global or local scale?

Operating costs and the battle for both the fan base and corporate support are cited as the most challenging aspects for long-term sustainability. Teams are always searching for ways to cut costs and make their operation more economically sustainable. This objective becomes overshadowed in a lot of cases as race engineers discover new ways to spend the cost savings trying to make the car go faster.

Increasingly, motorsport, like many other professional sports, has become a part of the entertainment industry and this has changed the way the sport operates in a lot of ways.

The availability of the sponsorship dollar is dependant upon the amount of fans the sport can reach and hopefully translate into product sales. Presumably they can improve their economic bottom line and then, in turn, keep supporting the team with sponsorship dollars.

Rule makers try to make the cars more even, in an effort to close up the competition, but engineers try to make the cars go faster and increase the competition.

These steps increase the appeal to the fan base, which attracts more sponsors and so the wheel continues to turn—economic sustainability at work.

Briefly explain the pressures existing to give motorsport a 'greener' image in the USA.

There is currently no great pressure for the USA motorsport industry to go 'green'. Most insiders believe there is not enough being done to achieve this aim, but freely admit that it will be quite some time before most meaningful initiatives are adopted into daily routines. Most sanctioning bodies in the USA are trying to become proactive and keep ahead of the game in relation to the 'green' movement and any government regulations.

NASCAR appears to be dragging the chain with teams still running Sunoco race gasoline. Australian V8 Supercars are slightly ahead of the game having made the switch to 85% Ethanol blend fuel. Indy Car has probably created the best program so far whereby the teams have to use 100% fuel grade Ethanol, a 99% renewable fuel source.

At this point of time external pressure exerted on the USA motorsports industry is minimal. Most insiders would see this as being a good thing, as most governing bodies have a reasonably good reputation for self-regulation when it comes to publicly sensitive issues.

It is well worth mentioning a vehicle with a totally green focus that was on display at the PRI tradeshow. The subject is an electric powered open wheel vehicle, which it is hoped will form the basis of a totally new race series. Founded by media proprietor Ben Johnston, the vehicles will be based on Reynard and Panoz Champ cars. The series aims to provide a platform for all green initiatives in the automotive industry. Details can be found on the following website: http://www.greenprixusa.com/home.html

Where are the identified pressures coming from? Internally, Externally, The public, or the Government?

The US Government and public interest groups are demanding automotive manufacturers and the automotive industry in general adopt green initiatives, but as yet minimal external pressure to 'green-up' the motorsport industry are apparent. Some pressure appears to be occurring internally, but there is still a long way to go before any real advances are made, with some sanctioning bodies using the green image as part of a clever marketing campaign in an effort to attract more public support.

The current pressure to go green can be seen as meeting a demand to decrease fuel consumption or a move to totally renewable energy resources. While this is a small part of the equation, it will actually extend into every facet of the future motorsports team operations.

There is no doubt that the day will come when mounting pressure will change the face of motorsport forever (not necessarily for the worst though) with sanctioning bodies and category organisers being well aware of the situation, slowly introducing new initiatives as they become accepted by the general public.

How much has the GFC affected the motorsport industry in the USA?

The GFC severely impacted the entire USA economy, as it did in most countries around the world. Major teams in the USA suffered a loss of major sponsorship dollars as most businesses cut costs in an effort to ride out the GFC. This had an immediate impact on the amount of dollars teams had available to keep operating. Most teams shed workers in an effort to decrease their total spend, resulting in those considered to be in excess to requirements having to find new jobs.

As the GFC took hold, many Americans lost their jobs, which meant that they could not afford to attend some major race events; this had an obvious flow on effect with promoters and track owners not earning the same return on investment per event. One silver lining to this dark cloud was that many race fans were suddenly attending the short tracks where traditionally they receive better value for money.

Strangely enough there were the same number of events and races, indicating that things may not have been quite as bad as first thought. Bruce Ashmore states, *"Basically teams spend all the budget they lay their hands on, so the global spend is down but the show looks the same".*

Briefly describe the measures that have been implemented towards the sustainability of motorsport in the USA. I assume there have been measures in the past, with changes in regulations coming under this banner, for example, environmental, economic, and social.

"Nothing is responsible for sustaining motorsport. Motorsport survives because people want to do it. And want to be seen doing it", suggests Bruce Ashmore. *"The majority of teams survive on money from sponsors who expect good exposure in their pursuit of a decent return on investment. With this in mind the GFC has shown most teams that there are many facets to the term sustainability. One of the most important has turned out to be the fight for 'economic' sustainability. This has forced team owners and managers to become more financially responsible in their everyday dealings. That being said, teams will still find ways to spend the majority of their income on developing their cars to perform better in an effort to make the race, or improve their on track performance. Teams have been challenged with exercising good financial control, trimming expenses without trimming performance".*

Environmental and social sustainability go virtually hand in hand as most efforts to satisfy either will have an effect on the other. If motorsport organisers push to adopt new methods to be seen as environmentally responsible this will have a positive social effect, while conversely if they choose to ignore this area it will have a negative social impact.

To quote Ashmore once again, *"Racing is a drug and people do it because of the competition and because they want to be considered a winner".*

Can you see the evolution of alternative or biofuels playing a big role in the future of motorsport and the way that you currently do business?

The resounding response to this question was yes; alternative fuels will play a big role in the motorsport scene in years to come, with Tom Weisenbach, however, predicting, *"I don't think it will make its mark on the racing industry for another 15-plus years".*

Others might beg to differ with Indy cars already using 100% fuel grade ethanol fuel. Some other categories and forms of motorsport have been using LPG for some time now (LPG has a higher octane rating than petrol and is therefore capable of producing more power given the right engine combination). Interestingly, ethanol fuels also have a higher octane rating than petrol.

There is some experimentation with hydrogen powered and hybrid racecars, but as yet there are no practical examples actively competing. Diesel fuel technology has been keeping pace with change and this has seen a number of diesel fuelled vehicles winning quite a few races around the world, although this is due largely to the decreased fuel consumption that results in less pit stops, as much as anything else.

Motorsport will adapt new fuel technologies once they have been proven and introduced. By the same token the motorsport industry is ideally placed to bring these technologies to the attention of the masses.

What measures do you employ to reduce the impact of your operations on the environment?

The idea of competing in motorsport and being environmentally conscious seem to be at opposite ends of the spectrum. Motorsport is all about competition and winning. With this thought in mind Bruce Ashmore feels that the environment, *"Isn't given a thought"*. While Kim Green reports that, *"With the racing team I owned we were always very conscious of being environmentally responsible"*. Green goes on to state that, *"As promoters they would even work with local governments and encourage race patrons to adopt the recycling mentality".*

The Fellow's opinion is that no single person in motorsport goes into competition with the intention of damaging the environment, but if racers are to become more environmentally responsible Ashmore believes that, *"The rules need to be in place to promote these thoughts"*. Perhaps the answer lies in education. If we can educate the new breed of race mechanic to have a slightly different mindset then perhaps we can slowly turn the tide.

Do you see the reduction of our 'carbon footprint' as important? This includes participation at events and transportation to and from events.

Unless teams are forced to comply with changes to certain rules and regulations in order to reduce the carbon footprint involving motorsport, the issue probably won't be given any serious consideration. It would also appear that motorsport could be an excellent billboard for creating awareness of environmental issues, including the reduction of an individual's carbon footprint, as opposed to the carbon footprint reduction for the industry as a whole.

Gather Information and Gain Knowledge Regarding the International Motorsport Environment, Current Technologies, Methodology, Products and Services

How do you effectively manage staff when you have so many race commitments during the course of the year?

In the motorsport industry where long hours both on and off the track are commonplace (particularly here in Australia), the topics of fatigue management, Occupational Health and Safety (OHS), employee satisfaction and retention take on new meaning. It is not desirable to have crew members who aren't mentally and physically prepared for the challenges that will present themselves at any racetrack, at any time, anywhere in the world. Employee enjoyment and satisfaction is obviously a fairly important goal in motorsport as it should be in any industry.

Due to the sheer nature and popularity of motorsport, drivers can quite often achieve the same status afforded by movie stars and other professional sports people. This 'Hollywood' image rubs off on other members of the successful teams and creates an aura that surrounds the team, and can consume everyone around it. It is for this very reason that most crew members want to work for, and be associated with, a winning team. Most people who have the opportunity to work with a winning team are prepared to do so, even if that means a slightly lower wage than would be available elsewhere. Motorsport has become a part of the entertainment industry, and crew members now have the opportunity to travel nationally and internationally.

Teams adopt different approaches to achieving employee satisfaction and it would be fair to say that it varies drastically from one team to the next, dependant upon the teams' pecking order, in relation to their popularity with the fans and their financial position. Some of the incentives offered to crew members range from sharing in the prize money that comes from winning races, discretionary bonuses based on their work performance, getting to 'stay over' in popular locations if time permits and finally just flying out as early as possible after a race meet so that crew members can be home to enjoy time with family and friends. Nothing motivates likes success and another great motivational strategy is for the team to employ a driver who knows how to win.

In the USA it appears that in both NASCAR and Indy Car there is no problem with staff retention and, therefore, very little staff turnover. Once crew members become burnt out with travel they tend to move solely into the workshop. It is quite common for staff to work straight from school until retirement.

Fellow's observation:

"It sounds like a completely different situation to teams in Australia where many team members have limited tenure, maybe there are a few lessons to be learnt from the industry in the USA."

What new technologies have been or will be introduced to motorsport in the USA and what difference will they make?

Current rules in NASCAR don't allow for development and introduction of new technologies at a team level, with all aspects of the race vehicle being very tightly controlled by the rule makers. Likewise in the Indy Car series, nowadays considered a 'spec' racing series, rule makers have restricted teams to running one make of chassis, one make of engines and controlled tyres. This has eliminated any advances in technology at the expense of manufacturer support and fan support base, who now view the series as 'boring'.

Indy Car probably lead the pack along with the Gold Crown Championship running a close second, in relation to trying to reinvent themselves when it comes to the adoption of new technologies and opening up the competition to promote innovation. Some of these changes are being made in an effort to draw fans and manufacturer support, but also to be seen as being environmentally and socially responsible.

It was generally felt by the respondents and by the general fan base that new technologies need to be introduced to give a shot in the arm, particularly the Indy Car series, and make it more relevant for fans. This can be evidenced by viewing any of the blogs relating to either NASCAR or Indy Car, on respective Internet websites.

What is the process for determining the development and production of new products or the redesign of existing products? Who drives the process? Is it individual teams or the motor sport industry in general?

As previously stated, category sanctioning bodies over the last few years have reduced the opportunity for any team to gain advantage by introducing new products. When it comes to any safety-related topics, teams become very vocal, and sanctioning bodies are prepared to listen. When it comes to the adoption of new products, teams are constantly asking, suppliers are constantly lobbying, but sanctioning bodies have many different interests they must take into account.

These include:

- Overall costs to the teams; it is in everyone's interest to keep the costs of competition low. This ensures that teams can continue to compete.
- Competition on the track needs to be closely monitored to ensure that any changes do not result in domination by any one team.
- Circuit owners and race promoters need to have their financial concerns taken into consideration.
- Any changes have the potential to affect the total numbers in the fan base.
- Manufacturer and supplier needs have to be taken into account.

While it is important for sanctioning bodies to try and contain costs of competition to teams, it doesn't necessarily work out that way as teams end up spending more money on other minor areas in an effort to find that slight edge. These rules can have other undesired results that include the possibility of turning the series into a boring, sterile competition.

What do you think motorsport will look like in 2020 and beyond, not only in the USA but also internationally?

Bruce Ashmore believes that with the present rate of development displayed in the USA motorsport is destined to remain, *"much the same"*, so the old saying that the more things change, the more they stay the same, could prove true.

Within the motorsports industry there has always been an element of inventiveness and improvisation. It is this very trait that helps overcome any obstacles the rule makers put in their way. *"Every time the sanctioning body implements rules to slow the cars down the team engineers will find a way to make the cars go faster,"* states Tom Weisenbach. The typical race engineer spends most of their time trying to find new ways to make the cars go faster over a certain distance. Weisenbach also states that, *"Racing will be alive and well beyond 2010"*. With this thought in mind it would be reasonable to assume that no matter what the future may bring, engineers, designers and rule makers will find a way to make it happen, make racing safer, but more importantly make it competitive and entertaining at the same time.

Kim Green has a very interesting thought around the increasingly important entertainment side of the industry. Green believes that advancements in technology will bring a whole new experience to spectators with the possibility of being able to ride along with their favourite driver in a driving simulator.

It would appear that most people believe that nothing will drastically change the face of the motorsports industry in the foreseeable future. While self-regulation is a good plan, perhaps it will take pressure and intervention from external sources to spur the sport on, to adopt the new technologies, which could ensure the long-term viability of the sport and, therefore, the motorsports industry.

What training structures are in place to skill those working in the industry i.e. TAFE equivalent and university?

What bodies set the standards? What bodies write the curriculum?

What are the bodies responsible and the processes for quality control e.g. evaluation, monitoring reviewing?

Are these bodies government or other? What bodies run the courses?

On the subject of motorsport training Tom Wiesenbach reports that a few schools in the USA have added a handful of motorsport classes to their existing engineering programs. Indiana University Purdue University Indiana (UPUI) in Indianapolis runs a four-year motorsport engineering program. Schools mandate an internship in industry before graduation; the challenge is finding quality learning experiences for the students.

Several universities in the USA run excellent motorsport training courses in engineering, management, marketing and promotion. The latter three are the most relevant at this point in time, motorsport is now a sports marketing exercise according to Bruce Ashmore.

Although motorsport has been around for almost as long as the motorcar itself, it is only in the last ten years that people began to realise the need for training within the boundaries of the race team environment. Like any other industry there has been a natural progression in relation to work and job related roles and training. Training for the motorsports industry involves such topics as OHS and safe working practices, basic work related skills, task-specific skills, working environment specific skills, team environment, health and fitness and personal presentation, team management and promotional activities.

There are many motorsport training organisations in the USA. These range from:

- Community Colleges, (equivalent of the Technical and Further Education (TAFE) system in Australia) with programs like the Rowan-Cabarrus Community College Motorsports Management Technology program. Further details can be found at www.rowancabarrus.edu and the Central Piedmont Community College Motorsport Technology program, details of which can be found on their website http://www.cpcc.edu/transport_systems.
- University programs such as the Purdue School of Engineering and Technology at Indiana University-Purdue University Indianapolis (IUPUI) http://www.engr.iupui.edu/motorsports/index.shtml and Winston Salem State University (WSSU) Motorsport Management Program www.wssu.edu/motorsports.
- Two privately funded and run programs such as Performance Instruction and Training (PIT) www.visitpit.com and NASCAR Technical Institute www.uti.edu/Home/Nascar-Tech.

The varying organisations that offer motorsports training also fund their programs differently. The community college programs receive funding under a federal initiative through the OVAE and other programs operate on a budget comprising both public and private funding sources.

Unlike Australia, where nationally recognised training can exist largely due to our geographical make up and relatively small population, the USA is saddled with many different programs across the nation. The schools create their own curriculum (there are no federal standards due to so many different states) and have advisory councils that include industry representation and are ratified by the Board members of their organisations, thereby creating as many different training programs as there are training providers. This creates exactly the same issues we originally faced in Australia, where training conducted in one state would not necessarily be recognised in another state.

While it was something of a monumental effort to obtain agreement on a nationally recognised format for training across all states and territories in Australia, it would be something of an impossible task to have all fifty states in the US agree on a training regime.

If there was a typical motorsport career path, what would that look like?

Teams are now suggesting that the hopeful race mechanic should complete a motorsport training course first. With the growth of motorsports as a whole over the last 10 years, there appears to be an ongoing demand for new people in the industry as others move to different jobs for any number of reasons.

Tom Weisenbach is of the opinion that a new employee should undertake a four-year degree with at least three summers of real life experience. What the students learn in the real world is a lot more valuable than the degree. Bruce Ashmore and Kim Green feel that helping out at the lower end of the competition scale will build the necessary skills required for long-term survival in the industry.

The common thought offered for those wishing to start a career in motorsport appears to be a personal investment by volunteering to assist teams in lower race series to gain valuable race experience. With the variety of courses available in the US that conduct a motorsport program, it is possible for the prospective race employee to complete anything from a six-month intensive program to a four-year degree in an effort to find their place in the industry.

There is probably no such thing as a stereotypical career path into the industry. There are, however, some basic steps that every new inductee to the industry must tread. This includes the assumption that everyone must start at the bottom. Discussions with representatives from various facets of the industry always reveal the same sentiment. Any new member of a team needs to prove their worth before any significant investment by either team management or Fellow members will occur. Without this confirmation, any entry into the motorsport industry will be short lived if the individual cannot display the ‘right stuff’ in relation to the high-pressure team environment.