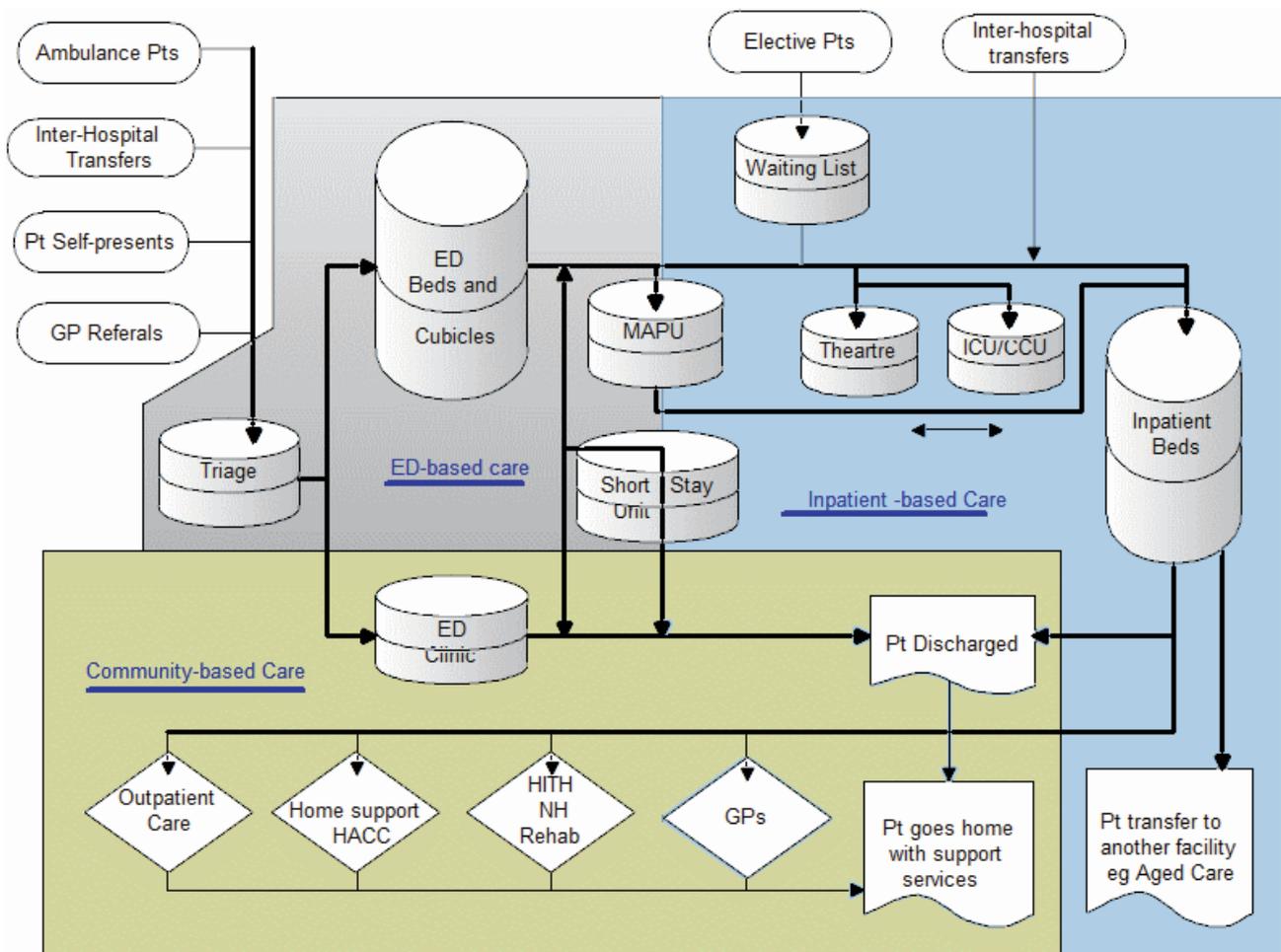


New Engineer JOURNAL

Servicing Manufacturing, Industrial Engineering and Engineering Societies



www.iie.com.au

In this Issue

- ◆ Lessons from Toyota – The Power of Purpose and Culture
- ◆ The TRIZ technique for defining functionality in value engineering
- ◆ Occasional Address to Graduates
- ◆ Engaging Nurses in Lean in Public Hospital Wards
- ◆ An IIE - EEA IE Training Course Initiative



**ENGINEERS
AUSTRALIA**

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Inside Front Cover

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New Engineer Journal

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Contents

Editorial 2

IIE Federal President’s Report..... 3

Lessons from Toyota – The Power of Purpose and Culture..... 6

The TRIZ technique for defining functionality in value engineering..... 9

Occasional Address to the Graduates at the University of Newcastle the 3rd of October 2013..... 11

Engaging Nurses in Lean in Public Hospital Wards..... 14

An IEE - EEA IE Training Course Initiative... 19

Front Cover: Emergency Department Flow Diagram for a typical Australian Public Hospital. This diagram provides a background for this edition’s featured article “Engaging Nurses in Lean in Public Hospital Wards” by Gough and Ballardie.

FORMAL PAPER REVIEWS

Leading papers published in this Journal are fully refereed. This service is available through the **New Engineer JOURNAL**. Papers which are to be fully refereed for formal publication may be submitted at any time.

“New Engineer journal – just like a box of chocolates ... you never know what you are going to get” (Apologies to Forrest Gump and friends)

One pleasant certainty, however, is always the up-front Federal President's report to the IIE membership. In this edition of the **New Engineer**, Lex Clark's 2013 AGM report is presented in full. It highlights the most recent developments in the re-connection of the IIE with Engineers Australia (EA) and developments within the IIE itself. Lex reports on:-

- EA's keenness to re-commit to the role of its technical societies (incl. IIE/IES)
- EA's database connection to IIE's database
- EA's website linkage to the IIE website (soon to be updated gratis by EA)
- IIE's partnership development with Engineering Education Australia (a wholly owned subsidiary of EA) to present IE training programs to the whole of the engineering community within Australia starting in the 2014 new year (See 'STOP PRESS')
- Establishment of an IIE Facebook page within the IIE website.

Lex concludes with a positive outlook for 2014 in the further progress of these and other developments.

A mixed bag of articles, papers and notices then follows:-

First invited article comes from Jana Krizova Hocken, a 12 year graduate of the Monash IE course. She has had an eventful professional IE career to date starting as an IE with Toyota, with local and overseas experience, through to her present roles in consulting, training, etc. through her own two companies.

Jana's article: 'Lessons from Toyota – The Power of Purpose and Culture' is a powerful statement as to why so many companies try to emulate the Toyota lean system, yet inevitably fail. Techniques aside, it is the culture of empowerment and ownership of the process (including trust of employees) - within a context of clear vision and

purpose - that she states is at the core of Toyota's continuing success.

A technical paper by C.H.Wang is then presented, titled: 'The TRIZ Technique for Defining Functionality in Value Engineering' compliments previous papers by this author, and those recently authored by Lex Clark.

In this paper, Wang guides us through the basic interacting elements of any system by use of the TRIZ Substance Field Model. Through the agency of a simple example, Wang demonstrates how to better value engineer the function of a system's mechanical elements in realising a superior value-engineered product.

Now for something really different! John Blakemore's recent occasional address to graduates at the University of Newcastle is a first for **New Engineer**. As a first graduate himself of the University, John offers some homely but never to be outdated advice re: the continuing challenge of change in technology, opportunity, career and the never ending need for innovation to survive- all important reminders not only to graduands but to us all.

Finally, a second invited paper rounds out this issue of **New Engineer**. Following their very successful paper in the October 2012 edition, Richard Gough and Ruth Ballardie return with: 'Engaging Nurses in Lean in Public Hospital Wards'.

This paper is an outstanding contribution from two lead authors. It is a facts-based presentation of an Australian case study in implementing Lean in a medical and surgical ward of a major public hospital. Read in conjunction with Jana Krizova Hocken's article, there are many lessons to be learned in implementing Lean best practices not only in car manufacturing but in all forms of service industries too.

Enjoy the reading ...

*Dr. Damian Kennedy,
rdk4567@gmail.com*

Institute of Industrial Engineers Australia Federal President's AGM 2013 Report

www.iie.com.au

After I took on the role as the new Federal President of the Institute of Industrial Engineers Australia (IIE) at the last AGM held in Melbourne on 8 September 2012, the first major decision we made was to re-establish our connection with the Institution of Engineers Australia, better known nowadays as Engineers Australia (EA).

While IIE has operated as the Industrial Engineering Society (IES) of EA since about 1995, this has been somewhat at arms length as we reverted back around 2003 to controlling our own internal IIE administration and database. This included the introduction of a new Membership Identification numbering system for new members who joined after 2004.

Over the last year, Engineers Australia, with over 120,000 or so members, has been reviewing its General Regulations on the roles and requirements as the key Learned Society for Engineering in Australia. This has included recognition of the growing importance and roles of the 28 or so Technical Societies in EA which includes the IES and, for example, the Australian Cost Engineering Society, the Risk Engineering Society and the Systems Engineering Society of Australia. You can see a full list of the Technical Societies with their links on the EA website: www.engineersaustralia.org.au at the bottom of the home page.

Only ten of these Technical Societies are Incorporated with their own Constitutions, one of which I am happy to say is the IIE/IES. While IIE already has a negotiated agreement on the relationship we have with EA as the IES, this may be reviewed in the light of the new developments. What this does mean however is that the relationship of IIE with EA will be on a much sounder basis than that originally developed in 1998. Members of IIE/IES will retain their present membership grades.

Membership Database

While the membership of IIE peaked around 1974 at some 1,365, there has been a slow but steady decline afterwards to where we seem to have stabilised over the last five years with around 390 on our present IIE database. However, the number of these who are financial tends to fluctuate over time. This decline in membership has also been common in many professional organisations across Australia and overseas.

EA maintains its own database at present, one where members can view and update their own individual record through the IIE website www.iie.com.au. It is planned to transfer this data back on to the EA database which has not been updated since the 2003 changes. However, it should be

noted that all Industrial Engineers who have been, or still are, members of IIE and IES are permanently recorded in these two databases which thus provides a valuable record and a source of information on Industrial Engineering expertise in Australia.

For those members who were issued with IIE membership numbers since 2004 (eg. 2004805), a new EA membership number (also known as a Customer ID) will need to be allocated for transfer to the EA database. This will require these members to provide their date of birth to us, as this is a record EA use to distinguish those of their 120,000 members who might have the same names (there are, for example, two A.L.G. Clark's, one of which is me). The original membership number will still be valid and recorded (as are still the old alpha numeric number eg. C-125) but future renewals of membership through the computerised EA system will utilise their Customer ID as they call it. Most IIE/IES members already have this number from the changes made in 1995.

Online membership renewals and applications should be in operation through EA by early next year, although we are treating this with some reservations as there are some issues such as methods of payment and IIE vetting of applications.

IIE/IES Website.

At present the IIE/IES website www.iie.com.au can be accessed directly or through the link on the EA website. The present IIE website has been in use for some years and is somewhat dated in appearance, but is maintained through an ISP named Synchromedia in Queensland. It is also somewhat out of date in content at present as we arrange for changes through EA.

EA offer a free website through their website, examples of which can be viewed (such as that for the Australian Cost Engineering Society). While they are very basic (and a bit boring), they do provide the access to the wide range of EA services and contacts which of course can be presently accessed in the reverse direction through the IIE website.

Facebook and YouTube.

The Membership Chairman, Scott Fairburn, last year set up an Institute of Industrial Engineers Australia Facebook site which presently has some 99 members from around the world. The backgrounds of some of these members, their ages and their comments make an interesting picture for the possible changes of Industrial Engineering in Australia.

Similarly, the range of enthusiastic Industrial Engineering videos to be found on YouTube can be also a promotional resource for use in Australia. One video, "Industrial and system engineers make a difference everywhere" has been useful in explaining IE within EA to staff who we find have little or no idea of what Industrial Engineers do and how proud they are of their discipline. We need to make an Australian IE video for YouTube.

Industrial Engineers in Australia have found that while their expertise is valued in a very wide range of activities, the recognition and understanding of this expertise has seemed to wane over a number of years for a variety of reasons. Others, particularly in Management Consulting, have taken over roles that have been carried out by IE's in the past with often short term success, but without the long term benefits, interest and commitment to problem solving in the various industries in which they find themselves.

Industrial Engineering Training and Qualifications.

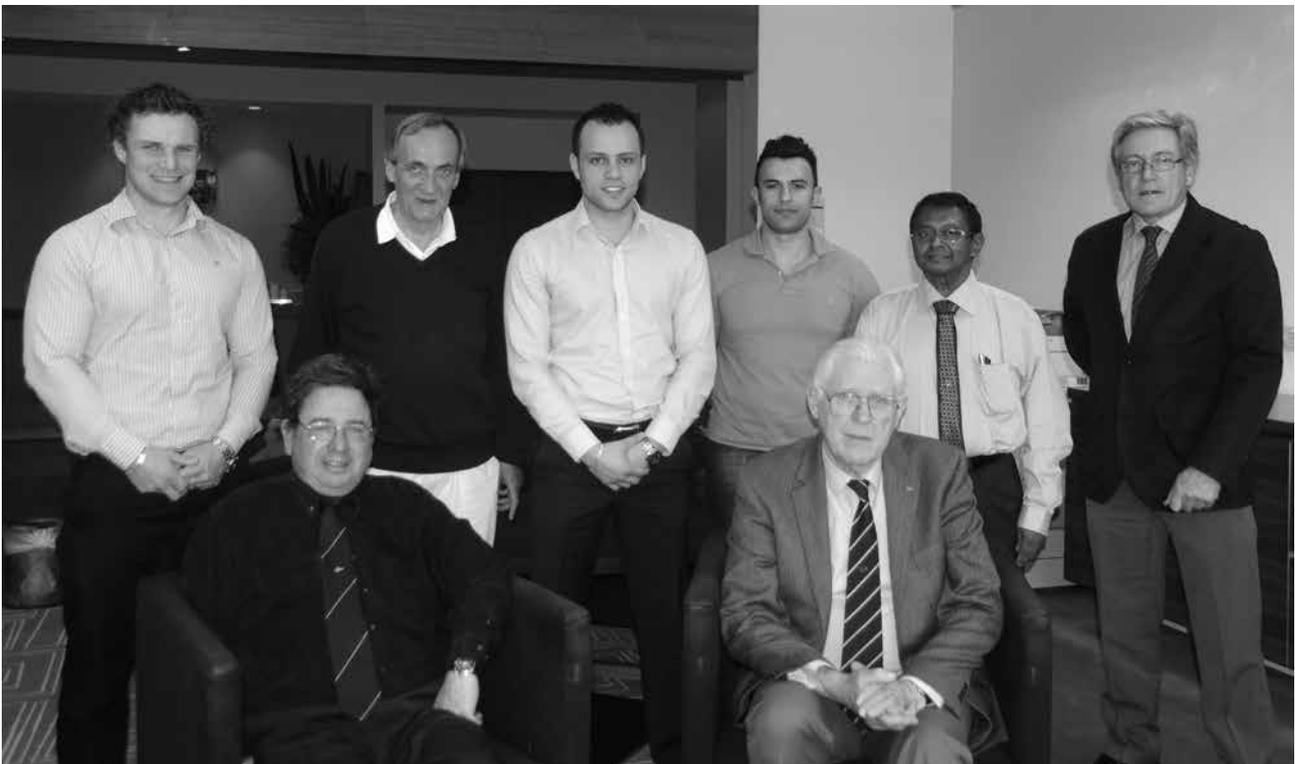
Over the year we, and particularly Damian Kennedy, have been talking to Engineering Education Australia (EEA – see "www.eeaust.com.au") about the running of Industrial Engineering technique courses through their excellent promotion and training resources system. Apart from the fact that this has long been a traditional IE role, it is also part of the EA role as a Learned Society with an emphasis on Continuing Professional Development (CPD). We have

also started to re-look at the Certified Practising Industrial Engineer (CPIE) qualification offered by IIE back in the early 1990's. This may be a difficult exercise to implement today, so Daniel Kulawiec will be looking at the implications.

While EEA provides the training facilities and advertising etc, IIE's part is to provide the expert trainers with their teaching materials (which EEA will reproduce) as well as provide the experience to indicate and target possible course participants. A potentially important opportunity for this was seen to be the Prime Minister's Manufacturing Taskforce Report in August 2012. With a change in Government, this might change, but the principles are still there.

While Australian lecturers are obviously preferred, lecturers from overseas can be an important part of this, and apparently around 60% of present EEA courses involve these, particularly from the United States it would seem. Singapore might be another obvious source.

We have also talked briefly with Dietrich Georg of Engineers Media about the publication of what they call Practice Notes. These are short publications of up to around 10 pages or so which simply outline how to practice specific techniques. These go into the EA library and are available (at a small cost) to anyone, including the general public. We have been focusing on a Value for Money Practice Note, but it would seem a range of IE techniques would be suitable for this.



IIE 2014 Federal Council Board of Directors: Back Row, L to R: Scott Fairburn (VIC) (Chairman Membership Committee), Dr. Damian Kennedy (QLD) (Journal Editor), Mo Barghash (VIC) (Webmaster), Sam Ghaith (VIC) (Federal Secretary), Selvarajah (Radha) Radhakrishnan (VIC) (Federal Treasurer), David Beale (NSW) (promotion and Development Director); Front Row, L to R: Robert Watson (WA/SA) (Senior Vice President), Alexander (Lex) Clark (ACT) (Federal President). [in absentia: Director, Chin Hak Wong (Singapore), Director to be confirmed via interview, Brenda Cockson (TBA).

With very few Industrial Engineering Degree and Work Study Diploma level courses now on offer in Australia, both post-graduate and undergraduate, there is also the opportunity (and perhaps need) to restructure and make available these types of individual qualifications through the now more flexible University and Institute modular courses subjects.

Industrial Engineering in Australia.

As a final comment, even the term Industrial Engineering has long been a source of ongoing discussion as to the accuracy with which it may or may not reflect the roles of Industrial Engineers. Commonly, the terms Production Engineering or Manufacturing Engineering have been seen to have overlapping roles but within the traditional industry of manufacturing. The term Management Engineering has also been used at times to describe the application of the principles and techniques of engineering to the practices of management.

However, the Macquarie definition of "industry" as "any large scale business activity" is perhaps a more accurate description on the wide range of industries in which IE's are employed today. These include the Manufacturing industry of course, but also cover the Health Care industry, Banking industry, Communications industry, Defence industry, Aviation and Transport, Mining and many more.

Interestingly this is perhaps also reflected in the number of applications from overseas engineers who wish to join IIE, which they interpret as the organisation that represents all engineering in industry, usually manufacturing.

Conclusion.

The year 2012/2013 has been an interesting year for IIE without a lot to see in terms of the changes being made and the benefits to it's members. With a bit of luck, the coming year of 2013/2014 should see in place a number of these benefits which, at the risk of repeating myself (from previous progress reports) will include:

- A new membership online application and renewal system.
- A new IIE website (www.iie.com.au) operated in connection with the Engineers Australia website www.engineersaustralia.org.au
- A stronger and more visible Industrial Engineering link to the other 100,000 Engineers Australia members which includes over 20,000 student members.
- A redevelopment of our IIE links with overseas Industrial Engineering organisations from the much more powerful Engineers Australia base.

If, as good Industrial Engineers, you have ideas and suggestions for ways that you believe the Institute can be redeveloped and support you as Industrial Engineers in Australia and overseas, please don't hesitate to contact me or members of the Board.

Industrial Engineering – a great career and a way of life.

Lex Clark
FIEAust CPEng FIIE, FIVMA
President

Institute of Industrial Engineers Australia

We seek your contributions to the New Engineer Journal

- recent articles, programs, blogs, etc. you think are topical and should have wider exposure
- your feedback on articles that have appeared in the **New Engineer Journal**
- articles on topics you think should appear in the **New Engineer Journal**
- 'other' – your chance to be **creative** !

**Please send your contributions to the editor:
Dr. Damian Kennedy at rdk4567@gmail.com**

Lessons from Toyota – The Power of Purpose and Culture

Jana Krizova Hocken
jana.krizova@dynamicfootprint.com.au

Introduction

Leaving university with an Industrial Engineering degree under my belt I was incredibly fortunate to land my first job with one of the most recognised companies globally – Toyota. Toyota essentially epitomised the application of Industrial Engineering concepts at their best. It really was and still is the leader in best practice, high quality, low cost, efficient and effective processes. It was an ultimate example for me on how to optimise the interaction of processes, systems, information, people, and technology to reduce costs, eliminate inefficiencies, improve productivity and maximise the bottom line. In fact the company is considered such a leader in best practice operational management, companies and industries across the globe are constantly trying to replicate its approach and methodologies in an attempt to also reap the rewards. However, more often than not they fail – and very quickly. As a family member at Toyota, I understood WHY.

Purpose and Vision

When we think about improving or optimising something, why do we do it? What do we want to achieve? How do we know that we are going to be better off?

To be able to improve and evolve as a company, it is fundamental that every company has a very clear Purpose. It is this Purpose that then helps the company to focus on the right things, and ultimately to improve or optimise the right things. No matter how big or small the change is, whether it is an optimisation of something or an innovation, it needs to be aligned with a company's Purpose and Vision. We must remember that we don't improve things for the sake of improvement. Improvement must have a purpose – it must result in the achievement of something better that we need or want.

At Toyota there is a clear purpose that is the heart of any improvements or innovations and focuses on the customer. It is to produce and deliver products (cars) that delight customers, are of the highest quality, lowest cost and delivered when the customer wants them. Further to this purpose however, Toyota have a wider vision:

“Toyota will lead the way to the future of mobility, enriching lives around the world with the safest and most responsible ways of moving people.

Through our commitment to quality, constant innovation and respect for the planet, we aim to exceed expectations and be rewarded with a smile.

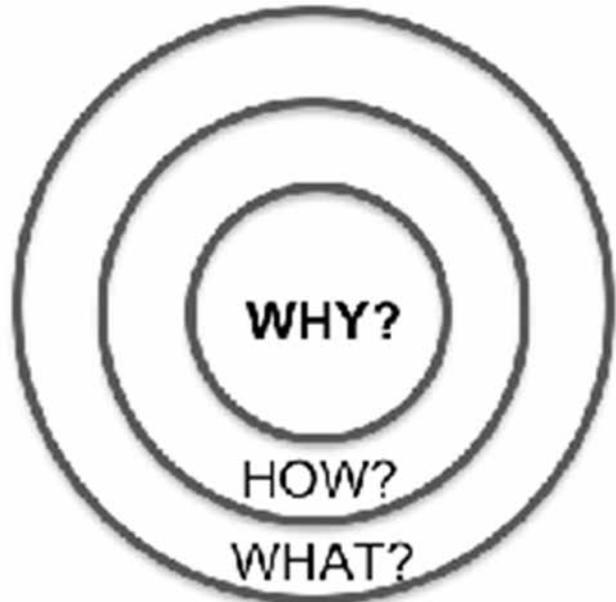
We will meet our challenging goals by engaging the talent and passion of people, who believe there is always a better way.”

Source: Toyota Company Vision Statement, http://www.toyota-global.com/company/vision_philosophy/toyota_global_vision_2020.html

This vision is an excellent example of having a wider purpose for improvement. This vision inspires people and makes it clear what the goal is. It talks about our world and creating a better and more sustainable planet.

It is this purpose that should drive continuous improvement. As Simon Sinek said in his famous TED speech on How Leaders Inspire Action, “Start with Why”. His Golden Circle demonstrates exactly how businesses should think about improvement or innovation starting with Why, then What, then How.

Simon Sinek's Golden Circle



Source: Simon Sinek, www.startwithwhy.com

It is surprising how many companies run off to improve their operations in one way or another and don't ask themselves WHY? Why am I doing this? Instead, they just jump straight into the What and How.

The Toyota Way

Most people and organisations that have a mandate to improve, or innovate, focus on one key thing – the processes, systems or technical tools they need to do this. What I call

the “hardware” of the business. They think that by simply applying some well-known tools they can magically transform their businesses into efficient, productive organisations. And sometimes they can make a few improvements... but very quickly the benefits disappear because the improvements are simply not sustainable. Unfortunately these businesses forget one fundamental thing – the people.

At Toyota it is the People that are at the heart of the way the company operates. They are the key to its continuous improvement and innovation. The Toyota Way is the culture of the company – its DNA which every employee from the cleaner to the CEO lives and breathes every day. And this cultural aspect is not easily replicated. It needs nurturing, focus, leadership, consistency, and commitment among many other things. It's these values and behaviours – what I call the “software”, which cannot just be picked up and transported.

The Toyota Way culture is based on two key Pillars each with its own components:



Source: *The Toyota Way*

Continuous Improvement

Continuous Improvement is the essential fabric of the Toyota Company. These words are instilled into the values of every employee. Toyota empowers and expects that every employee will constantly strive to improve their work and the things around them every day. This means that they are given the right to Challenge the status quo; to constantly ask What are we doing? Why are we doing this? What do we need to be doing? What do we need to advance? How can we do it better?

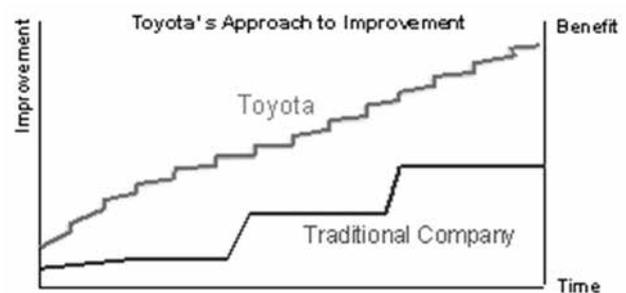
As a Toyota engineer I remember being challenged to challenge. We were always reminded not to ever say the words “it's not possible”. Instead we must ask “How can we do this?”, “How can we make it possible?”.

It is this strong culture of continuous improvement that drives every employee to think about how to improve processes, systems, operations and ultimately the customer experience. It means that essentially every single person puts on an Industrial Engineering hat, working as a team to innovate and find a better way. And it is only once you get all the people behind improvement and change, when

they own it, they drive it, and they sustain it, that a business becomes a truly continuously improving and evolving company. Importantly, however, the focus of improvement is always in trying to achieve the purpose and vision. Asking: “is this aligned with our purpose?” “Will it help us to achieve our purpose?”

Continuous improvement isn't about running a large-scale project; it is about improving small things, one step at a time, every day. It is improvement that is done everyday, everywhere, by everyone. This is known as Kaizen. No matter how little the improvement is, lots of small improvements make a big and more sustainable improvement.

Below is illustrated Toyota's continuous incremental improvements plus innovation approach to improvement compared to the traditional company approach of Big improvement projects:-



Finally, sometimes we have to think more broadly about improvement. Improvement isn't just about improving our current state; it's about taking us to the next level, advancing our society, our planet and ourselves. We, therefore, need to take ourselves outside our comfort zone and think of the bigger picture. This means that while businesses should always focus on what the customer wants, sometimes this isn't as simple. Sometimes the customer doesn't know what they want as it's not invented yet. As Henry Ford once famously said:

“If I had asked people what they wanted, they would have said faster horses.” – Henry Ford

Therefore, sometimes if we truly want to innovate we need to think not “What does the customer want?” but rather “What will make our lives and the customer's life better, easier, faster, cheaper and more sustainable.”

Respect for People

Respect sounds like a given, but it is surprising how many different things this word means to different people. In order to have an organisation that is continuously improving and evolving, you need people that will be challenging the status quo, thinking outside the box, innovating to generate ideas that move the company and its products and services to a better place.

This requires people to feel comfortable with challenging their colleagues, and superiors and similarly being challenged in a constructive way. People need to feel comfortable with

voicing their ideas and be encouraged and empowered to do so. And this can only happen when there is complete mutual respect for one another. Where people are open and transparent and willing to listen and share each other's ideas and opinions. It's only when people have this respect that there is trust in each other and ultimately exceptional alignment of goals and ideas and teamwork.

Unfortunately many companies that think they have complete respect and terrific teamwork are often the same ones that avoid change, have a blame culture, and reprimand people for challenging the "way we do things around here" (the 'culture').

Final Thoughts

My years at Toyota significantly changed the way I think and taught me invaluable life long lessons that I use everyday. The company fundamentally moulded my belief and value systems. When I think about improvement or inspire others to think about improvement, I don't look at it as a bunch of technical tools that I can apply. There is no right or wrong way for improvement – there is just a better way. Importantly to create truly innovative and differentiating improvement, companies need to think more holistically about it. They need to start with a clear and wider WHY? They need to make continuous improvement, innovation and advancement a priority in their values and culture but it also needs to be done for a greater purpose than just productivity or profit. Importantly, every person

in an organisation must be inspired by the purpose and be empowered to challenge the status quo, to improve and to be a part of something bigger. It is only once all these factors are at play, that a company will truly achieve excellence and be a global leader.



Jana is the founder and owner of her two companies Improve8 and Dynamic Footprint. She is a proven lean and business improvement expert with 12 years of global experience working in more than 20 countries across Australasia, Asia, Europe and America. She has supported hundreds of people and businesses and worked with

companies including Toyota, Bosch, Fosters, Commonwealth Bank, Deloitte and McKinsey in senior engineering, improvement, management consulting and executive coaching roles. Jana is a passionate entrepreneur, and enjoys inspiring, empowering and supporting businesses to achieve their potential. She is also the Treasurer of the AASSP, is writing her first book, is a regular speaker and presenter and spends her time between Australia and NZ where she is also supporting her husband's 1000 herd dairy farm..

STOP PRESS STOP PRESS STOP PRESS STOP PRESS STOP

IIE to offer IE Training Programs through Engineering Education Australia (EEA)

The first of a planned series of IE education modules, under the generic banner of **Industrial engineering techniques for professionals**, is to be advertised through EEA from late November 2013.

The first module is a **two day course** titled **MODAPTS work method time measurement and improvement**. It is scheduled to run February 5th, 6th, 2014 in Melbourne.

We seek your help in 'spreading the word' about this initiative.

The EEA link to the above course is at: <http://www.eeaust.com.au/MODAPTS-PLUS>

We invite all members of the IIE to make best use of their professional and social networking skills to alert people to this unique training opportunity.

The success of this initiative will ensure that the IIE will have a solid platform on which to further develop and expand industrial engineering training and practice in Australia.

The TRIZ technique for defining functionality in value engineering

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Introduction

Genrich Alshuller (circa 1978) initially developed a set of design rules, models, algorithms and physical principles based on his study of hundreds of thousands of product patterns. What resulted from this work was the original ARIZ system (or system of Algorithms for Inventive Problem Solving). This eventually evolved into today's TRIZ technique - a powerful technique now also used to initiate many of the 'Design for Six Sigma' approaches used in industrial settings today. The TRIZ technique can guide the problem solver/system analyst or design analyst to quickly determine the basic interacting elements of any system by the use of a 'Substance Field Model' (SFM). Such a model is illustrated in Figure 1:-



Figure 1. The Substance Force/Field Model (SFM)

Figure 1 suggests that by identifying the force/field acting on an object's substance/property one can generate a physical effect that produces the desired outcome.

As an industrial engineer, there is a great deal to be learned here as to exactly what constitutes (what can be called) a 'function'. Taking the above substance-field model as a guide, the function can be defined by the useful action of the tool on the said material in order to produce a desired result. While the desired result is an expected outcome of the tool action itself on the material, it is often necessary to define the physical effect of the tool-action itself.

Example: Defining the function of a tool

If we take a typical cigarette lighter as an illustration, we can say that the tool is the friction wheel in conjunction with the lodestone and the purpose of which is to provide a spark, which is the physical effect. The sparks then ignite the fume of the methane fuel to provide a fire. Using the Substance Force/Field Model, we can then map it as shown in Figure 2.

How to value engineer the function

From the above SFM, the industrial engineer can approach the redesign of the function of a cigarette lighter from many possible design options. At the basic function level, for instance, we can change from the friction wheel to a more robust (solid) heating element using direct current at the press of a switch to ignite the methane gas. Other

changes that can be made include:-changes to the volume of both static and dynamic parts, changes to the density of the component parts, changes to the conductivity of the heating coil, changes to the concentration of the methane gas, or the torque required to turn the friction wheel, etc.

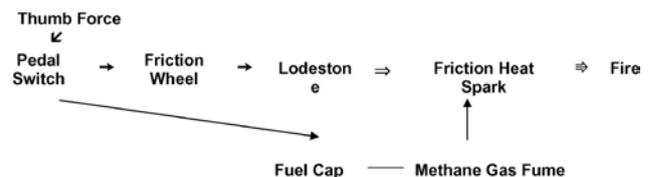


Figure 2. The Substance Force/Field Model of a cigarette lighter

The higher level TRIZ design approach

On a higher level, the SFM can be expanded into a complete product's useful and harmful effects model giving complete information for identification of conflicting design features within the system. Modeling a solution at the point of Technical Conflict of a tool or system often leads to design optimization rather than that of the usual trade-off solution.

From Alshuller's initial work, some 76 rules of design have now been derived from thousands of follow-on product pattern studies. These 76 Design Application Standards are classified into 5 classes for ease of search and application :

- Category 1 Standards – How To Construct and Deconstruct Substance Force/Field Models
- Category 2 Standards – How To Conduct Technological Transition Into Complex Substance Force/Field Models
- Category 3 Standards – How To Develop Super-System Models & Micro-level Models & Particles Level Models
- Category 4 Standards – How To Apply Measurement & Detection Models
- Category 5 Standards – How To Apply The Desired Physical Effects

In addition, Altshuller also invented the 'Creative Idea' matrix. This matrix incorporates 40 creative principles and provides a table of creative ideas to help resolve design conflicts based on "What is the desired feature?" and "What deteriorates as a consequence?" It only takes a few common product designs to illustrate the sound organisation of the creative principles behind the 40 Principle Contradiction Table.

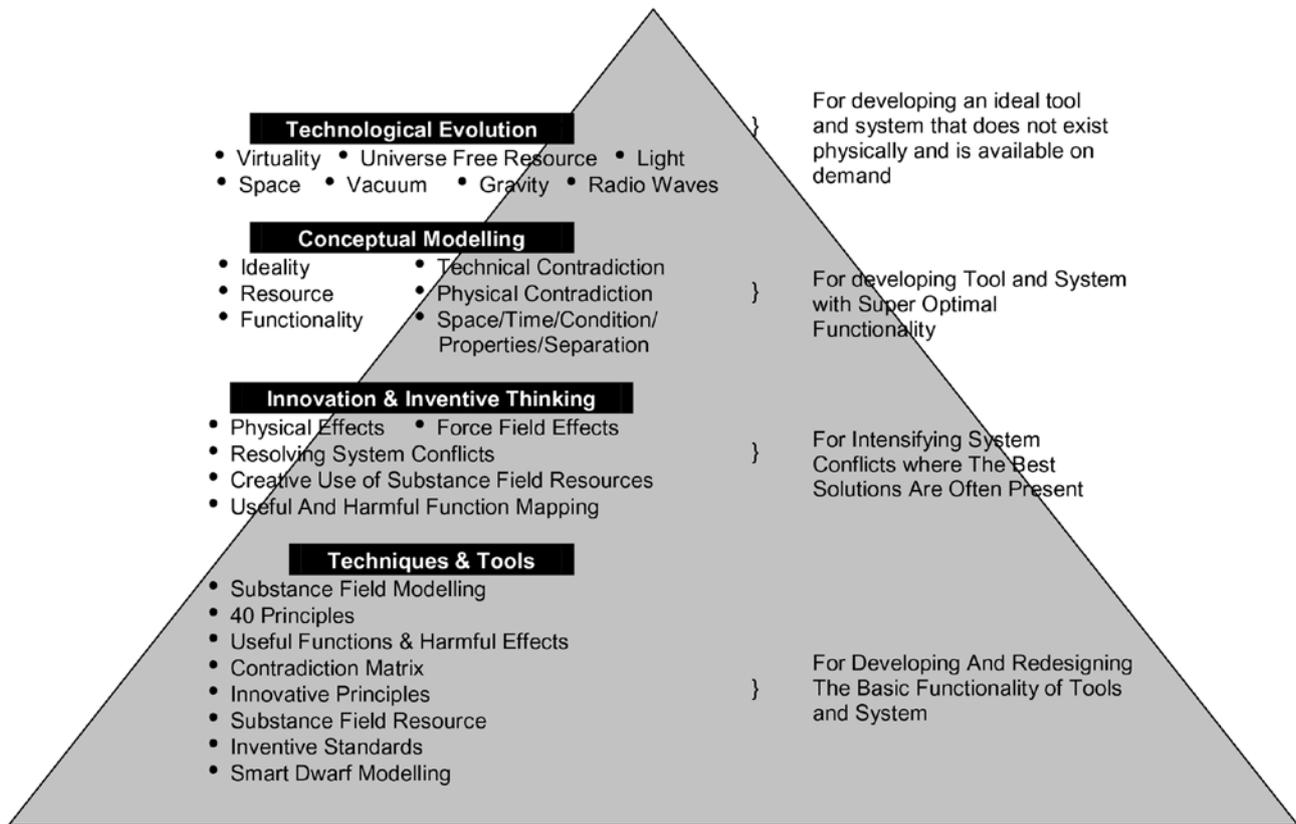


Figure 3. The technological evolution of the TRIZ technique

The TRIZ technological evolution

TRIZ techniques offer the greatest opportunity to industrial engineers to make a break-through in using a robust tool for defining a tool or system functionality. The SFM and its expanded version of the Useful Function And Harmful Effect Mapping technique make it possible to identify all the weakest points of a tool or system to develop innovative or inventive solutions.

This provides the greatest assistance to value engineers who are often confronted with the need to maintain or improve functionality with the least cost solutions. TRIZ does this perfectly. It is a tool that will render a great deal of assistance to value engineering. See Figure 3 above to see how the TRIZ technique has continued to evolve.

The ARIZ process

The most difficult part of the TRIZ Technique is the stringent step-by-step ARIZ procedure (Algorithm of Inventive Problem Solving). While Genrich Altshuller

developed the original ARIZ, many TRIZ Masters and TRIZ Specialists have developed many other sets of equally or more powerful ARIZ procedures.

The purpose of ARIZ is to help analysts go through the complex steps of TRIZ. This way, analysts are guided to arrive at Ideal Final Results and to develop solutions with X-resources that will not sub-optimize any final solution.

Conclusion

The use of TRIZ techniques advances problem solving skill many levels forward, so that the solutions are always in trend with time.

However, TRIZ does require a multi-disciplinary knowledge field to capitalise on the current and future trends of technological evolution to engineer the final ideal result. It is a tool, however, that can equip industrial engineers with the ability to evaluate many design options. It is also an invaluable tool that advances the profession of value engineering.

Occasional Address to the Graduates at the University of Newcastle the 3rd of October 2013

Dr John Blakemore, PhD. Post Doc Nuclear Technology, MSc, BSc, FAICD, FAIM, FIEAust, CMC, CPEng.

Chancellor, Vice Chancellor, Members of the Council, Staff of the University, Families and Friends of the Graduates and most importantly, graduates.

As the first graduate of this University in 1966, it gives me great pleasure to address you today. I have watched with great delight the growth of what has become a highly regarded tertiary institution from what we used to call "the Tech" at Tighes Hill.

I would like to talk to you about two major influences on your future professional life, **change and innovation**.

My own career has been full of both.

I completed a BSc and MSc part time and then a PhD on an International Nickel Fellowship. I then studied nuclear engineering in Sydney as the future looked particularly good for nuclear scientists at that time ... alas this was a dead end. My career took a massive change in direction when Australia did not build the 500MW nuclear power station at Jervis Bay in 1970. I no longer had the career path I desired. My professional life then developed to accommodate change and use innovation as a major tool.

Who would have thought that the career of one person would spread from spraying liquid steel at 1600 degrees with liquid oxygen at minus 196 degrees to studying the explosion of 250mm thick steel nuclear reactor pressure vessels to participating in the launch of the next season's range of female swimwear at Homebush Olympic pool worn by Australia's most attractive models ... Where would you rather be? Launching swimwear or working in a blast furnace? What a change!

Change in careers is no longer unusual and you must be ready for it. The best preparation is a good solid University education and an awareness that the learning process is about continuous skill and knowledge development innovation and creativity. Our ability to see what is front of us should not be a struggle. Education never stops.

Any vision of the future rests firmly on the foundations laid in the past. As Isaac Newton once said "I see further because I stand on the shoulders of giants." So, to succeed you must firstly absorb the sunshine of our ancestors creativity and achievements and then build your own professional future. The University education you have received here will enable you to do that with unbridled success.

Digital data now enables us to innovate faster than

ever. The internet brings together a degree of teamwork and collaboration never seen before. This is a tool that is intrinsic to future success.

When I first used a computer at this University it was housed in a separate building some distance from my lab and I had to book in 8 weeks in advance to use it. The University has certainly come a long way since then and its reputation continues to rise. As well Newcastle, the city, has shed the industries of the past and embraced new industries with gusto and enthusiasm. You are awash with opportunities.

The next major wave of change in all economies is the speed of innovation.

You must be at the heart of the creativity and research needed to use new digital data more effectively to enhance standards of living, improve health and assist in solving all types of people problems as well as technical ones. Lead the way.

Eratosthenes, born in 276 BC, measured the circumference of the earth at 40,000km using a stick. That is the sort of innovation we need for the future

So, let your imagination run wild.

- Consider this. "The idea is there, locked inside, all I have to do is remove the excess stone" ... Michelangelo.
- Or perhaps this gem: "Computers in the Future will weigh no more than 1.5 tonnes" ... Popular mechanics 1949.
- Here is another: "It is impossible for anything heavier than air to fly" ... The Royal Society, London 1895.
- "640k should be enough" ... Bill Gates 1981.
- "I think there is a world market for maybe 5 computers" ... Thomas Watson CEO IBM 1943.

Albert Einstein postulated that there must be a "cosmological term", to explain the stability of the universe. Five years later he described this as the greatest blunder of his life. However with recent gains in string theory and parallel universes maybe Einstein was right the first time.

Even the best of us are unable to grasp the full significance of all the events of the world around us. Accelerated technological developments, compounds constructed molecule by molecule, solids built atom by atom, cloning, genetic engineering, photovoltaic paints, climate change ... an endless stream of new ideas needed to embrace new opportunities.

Opportunities created by the parallel universe will raise the bar even higher but the good University education you have received here will equip you admirably to deal with these challenges and win.

Countries are becoming less important and Multinational corporations more important. Many have sales in excess of the GDP of most nations. **Who rules the world?**

The world has suddenly become smaller, faster, but alas no more compassionate. National boundaries are being dissolved by social media, small business can sell to the world from home, the personal wealth of one man can become greater than the total GDP of a small nation.

The real world poses a new set of challenges very different from those you have faced as an undergraduate. You are at the very beginning of a very exciting journey. Success will depend on your adaptability, innovation and creativity and your enthusiasm to embrace change and further develop your skills built on the solid educational foundations laid here. We need enthusiastic, intelligent creative well educated people like yourselves, people capable of thinking outside the square, as well as asking “why? As well as “why not”.

Australia is rebuilding. Its current potential economic strength is very significant as Australia always punches above its weight. We have low inflation, low interest rates, massive reserves of raw materials, a stable land mass and political climate. In fact we are the envy of the world, but it is mainly because of our incredible mineral wealth, wealth in what is in the ground not wealth created by adding value. Our value added industries have not kept pace and we do not compete on a level playing field. We cannot afford to continue to ride on the back of high commodity prices and mining. We need new innovative thinkers free from old ways. We need to question old habits.

Not so long ago, I was engaged to rescue a manufacturing operation where the final finished product was selling to the consumer for \$26 while the total factory cost including raw materials was slightly less than \$1. You would immediately think that the company would be highly profitable but its supply chain to the end user was a mess. Lead times blew out and all that happened was that people in the supply chain made money from warehousing and the manufacturer was going broke. Such a chain adds no value but adds to our GDP ... crazy? Here is a problem that new ideas can fix? The definition of GDP needs revision as it cannot be easily translated to productivity.

An eminent economist from Cambridge in 2008 in Sydney when he analysed Australia's GDP said that the most important contributor to Australian manufacturing productivity was warehousing. So, if you close a manufacturing site and import and establish a warehouse this contributes to our productivity?

Please young graduates help me educate the people and solve this problem.

Over the last 30 years our company has diligently studied and worked for what we consider to be some of the world's best companies. These include, Honda, Panasonic, Mercedes Benz, Braun, Pirelli, Cochlear, Canon, BHP, CSIRO, Toyota, Bluescope, Speedo, Seeley, ANCA and many more. We have tried to measure the rise and fall of many giants of the past, GEC, Email, Ford, Chrysler etc. The key issue signalling demise is the lack of innovation and the inability to move quickly as the market and technological developments take hold. **Apple and Microsoft should watch out for Samsung, Mercedes Benz should watch out for Hyundai.**

Working with a wide range of industries I am continuously surprised at how slowly opportunities are seized by most companies. I still wonder at the opportunities lost.

Many years ago I measured the efficiency of a coal mine in the Hunter Valley. My measurement was 32%. The management were initially scathing in their criticism of my report since McKinseys claimed that it was 98%. **Quite a difference!** We were given a chance. In less than 6 months the productivity of the whole mine increased by 16% as I worked with staff in the bottleneck area. However, the coal loader at Newcastle could not cope with the volume of coal and the improvement program ceased. Was that a decision with vision?

All this raises simple issues on the definition of efficiency and productivity. Economists, engineers and politicians can't agree but while we think we are good at say 98% and fail to see the significance of the 32% we are thinking **inside the square**. It requires clever young people like you to break the mould ... remove the excess stone.

How far would Mendeleev have progressed with the periodic table of elements if everyone had a different definition of atomic weight? How far would Erasthenes got measuring the circumference of the earth in approx. 300 BC if he had not realised the opportunity presented to him as the sun passed overhead above a well.

So let's clear the decks.

Business more in the future than the past must be fast, creative adaptable and move at high velocity with greater innovation, more adaptability, more creativity.

To give a classic example of how we can innovate and be better than the rest I would like to describe very briefly a very successful Newcastle based initiative, Zincalume coatings for steel.

Australia became a world leader when we worked on this product by using a range of licensing agreements, patent and research papers to innovate and speed up the production line and increase productivity and reduce costs. Our team solved all these problems because of the training and education delivered by this University ... **so be proud.**

On the way through I was openly criticised and at one time demoted till exonerated. Agents of change and innovation are targeted sometimes mercilessly because they

are attacking cherished ideas that are well established, but innovate we must.

I left research when I could no longer tolerate the death knell of many of my ideas. It was common for directors to say to me, sorry, we can't do that. **No one else in the world is doing that!**

So let me return to the swimwear parade at Homebush pool ... from steel to swimwear to timber to coal mines to nuclear power stations to aluminium smelters to cement factories and blast furnaces and pharmaceuticals and computers. The world is your oyster ... seize the moment.

The future is about opportunity, creativity, innovation and change.

As you move around the world in business you will find that the goal posts are always shifting. When you try to forecast where you will finish you will find that the finishing line has moved but with the start this University has given you, you will succeed.

So the future is all yours,

Your degree is just the start.

The idea is there, locked inside, all you have to do is remove the excess stone.

STOP PRESS STOP PRESS STOP PRESS STOP PRESS STOP

***IIE to offer IE Training Programs
through
Engineering Education Australia (EEA)***

The first of a planned series of IE education modules, under the generic banner of **Industrial engineering techniques for professionals**, is to be advertised through EEA from late November 2013.

The first module is a **two day course** titled **MODAPTS work method time measurement and improvement**. It is scheduled to run February 5th, 6th, 2014 in Melbourne.

We seek your help in 'spreading the word' about this initiative.

The EEA link to the above course is at: <http://www.eeaust.com.au/MODAPTS-PLUS>

We invite all members of the IIE to make best use of their professional and social networking skills to alert people to this unique training opportunity.

The success of this initiative will ensure that the IIE will have a solid platform on which to further develop and expand industrial engineering training and practice in Australia.

Engaging Nurses in Lean in Public Hospital Wards

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Introduction

The introduction of lean management concepts into nursing wards has become more common recently in Australian hospitals. This article examines the experience of the introduction of lean into a medical and a surgical ward in a major Australian hospital.

To set the scene, it is important to understand that nurses are under constant pressure to admit and discharge patients as quickly as possible in order to reduce the costs of patient stay in hospitals. In the hospital studied, Nurse Unit Managers (NUMS) in charge of the wards have a Key Performance Indicator (KPI), which requires them to get two patients out by 10 am and to conform to average length of patient stay requirements for particular illnesses. This pressure is amplified by the requirement to meet a KPI of getting patients admitted to inpatient wards within four hours.

Surgical and Medical Wards

In the surgical and medical wards studied both NUMs were faced regularly with having more patients in the hospital than the number of beds in their wards. This occurred by there being patients waiting in the Emergency Department, in the Recovery area after surgery and as outliers in other wards. Such pressure accentuated the need to discharge patients as quickly as possible.

In the surgical ward, a 28 bed ward with 55 nurses, there was a very high turnover of patients - up to six to eight a day due to the nature of surgery undertaken. In this ward 10 of the patients were in a high dependency unit with one nurse to two patients, 4 patients were in a step down unit and the other 14 were in a normal ward with four patients per ward.

In the medical ward, a 24 bed ward with 40 nurses, the turnover was lower due to the nature of the patients' illnesses, but discharges per day could vary from none to two to three and occasionally six. This variability arose from one group of patients who were admitted to the ward for tests and could be sent home later in the day if the results were positive.

Professional Identity

The professional identity of clinical staff in the hospital was defined clearly by a concern for patient care. Both

the senior nursing manager and the NUMs of the wards studied expressed these views. It was these values rather than a commitment to improved efficiency per se that drove their interest in use of lean management process re-engineering in the wards. The senior nurse manager clearly was concerned with the failure of *top-down* auditing checklists (such as those dealing with patient falls, wounds and nutrition) to be applied in the wards. The lean management wards strategy was seen as a *bottom-up* way of nursing staff developing templates and checklists to improve the quality of patient care. The ownership by nurses of the process of checking aspects of patient care was seen as more likely to yield greater compliance.

Streamlining processes in the wards was seen also as opening up time for nurses to care for patients by filling in relevant checklists with the patients and thus improving the quality of care.

Professional Development

The establishment of teams of nursing and allied staff to engage in quality improvement in the wards was complemented by a culture of professional development in the hospital which focussed on the gaining of post-graduate qualifications and undertaking a ward-based project to improve quality of care. This project based activity underpinned improvement projects in wards about issues such as falls, wound management and handover, which predated the lean teams in the wards. Quality and OHS requirements on public hospitals also make incidents like falls, bed sores and medication errors reportable, which encourages such projects. Further, prior to the introduction of the quality teams other initiatives such as the Federal Government funded Better Care of Older Persons (BCOP) provided resources for projects such as an audit of the nutrition by a nurse in the medical ward. Such prior and concurrent activities tended to be subsumed under the umbrella of the Lean project in the wards.

Lean Project

Prior to the implementation of the lean project, six staff (four senior and two junior) in each of the wards were given a two day training program explaining the lean work process change. They were taken through three introductory modules covering the concepts of a well organised (tidy) ward, establishing charts to show

how well the ward was meeting targets and how to create a whiteboard showing the status of a patient from admission to discharge.

They were also introduced to basic lean tools to enable them to analyse the causes of problems and develop templates. The tools introduced included: measuring nursing activities: waste walk; timing processes; process mapping tools, and audit planning.

A member of the Quality Improvement Staff was allocated to each ward to assist with the project during the early stages. This person attended the weekly meetings of the core team as an advisor.

More advanced modules directed at nursing work processes i.e. patient observations, admissions and discharges; shift handovers, meals, medicines, patient hygiene, nursing procedures, ward rounds were taken up by the wards. Choice of the modules to be done rested with the teams and each advanced module was supposed to take a month. However, work pressures resulted in them taking 8 weeks or more.

Implementing Lean Wards

The initial phase of tidying up the wards by emptying out cupboards, reorganising them so that overstocking was reduced and key consumables like dressings and syringes were clearly labelled (with an A3 photograph on the inside on how the cupboard should look) was positively received by nurses.

Different coloured bins were placed to contain waste products in strategic locations. Observation equipment such as digital thermometers, blood pressure machines, which had been placed all over the ward and some cases lost, were put on a stand where they were readily accessible. A white board, which set out the stage of a patient's treatment with different coloured magnets to identify progress, was also put up in the ward. The Nurses were requested to write on a separate board 'what bugs you' and 'what do you like' to get responses about the change occurring in the ward.

The NUM in charge of the surgical ward, reflecting upon her experience with the first phase of the project, considered that staff were getting involved in making changes to tidy up the ward. She considered that she was empowering them and that they wanted the changes.

Staff Involvement

The issue of the involvement of staff has to do with their attitude to work and personal development. For instance, a Grade 2 nurse in the surgical ward said she wanted to be part of the project because she could have a say in changes by being a member of the core team running the project.

A NUM in the surgical ward on the core team

considered that staff would get involved 'when they could choose what they wanted to do and had a passion to fix things'.

A NUM in the medical ward commented that involvement was to do with a 'nurse's investment in her work'. From her own personal point of view, if she saw something which was broken she would want to fix it. However, she noted that some staff in the ward were indifferent and would walk past something that was broken without noticing it.

Another aspect of this issue of involvement was that staff were expected to already get involved in a project (prior to the lean wards initiative) related to issues of patient quality of care and occupational health and safety (OHS). For instance one of the Grade 2 nurses indicated that it was up to her to choose a project and she thought being involved with the lean project was good.

However, as the Lean Wards project evolved beyond the initial phase, broader ward involvement did not develop.

Core Group

A lot of the responsibility for doing the work on different aspects of lean problem solving was taken up by a core group of senior staff (NUMs and Senior Nurse Specialists, supported by a couple of Grade 2 junior nurses). The junior staff tended to work with more senior staff on projects.

This group did the original two day training session and attended the weekly meetings on the lean improvement projects. A Grade 2 in the surgical ward noted that it was the core group that attended the regular lean meetings that took responsibility for carrying out the project. She thought that staff involvement was limited to answering surveys and commenting on audit results.

This changing level of involvement of staff was recognised by the NUM in the surgical ward. She indicated, after about 12 months into the project, that it largely fell to her and a small team of staff actively involved to get through further phases of the project and make improvements.

The NUM in charge of the Medical ward, reflecting on almost 2 years of the project, expressed a similar opinion claiming that he hoped that staff would run with the project, but that this was not the case and if he did not push, nothing would happen. He considered that his ward was very busy and staff found other things that consumed their time.

A NUM on the medical ward was negative about the project, as it got beyond the first phase, arguing that she resented it because no time-off was allowed to do the work. She considered that (with the work pressures) it

was not possible to change gears from dealing with very ill patients to analysing a survey even for a few minutes.

Work Pressures and Time for the Project

The nature of a ward including type of patients treated (whether it is surgical or medical) and the skills and attitudes of its staff tend to result in the ward interacting differently with the work flow pressures from the wider hospital.

How supportive the leadership of the ward is, also affects how the flow pressures are managed.

In the surgical ward a NUM, who was part of the core team, characterised it as a 'proactive ward' in which staff came to learn and develop. She also characterised it as a fast paced ward which attracted staff that had more incentive to be active.

The fast paced nature of the work and the pressures on staff are borne out by the turnover of patients. A senior nurse, who had originally been involved with the early phase of the lean project, commented that the ward used to have theatre on three days a week, but now it was five days a week with some days double theatre lists. On a given day the ward could receive up to eight elective patients from surgery over and above those in the Emergency Department (ED) and outliers in other wards.

The rate of discharge of patients from the ward is high with the NUM commenting that eight or nine patients (not uncommonly) could be discharged per day. The pressure to find beds for patients from recovery, ED and for outliers in other wards is intense.

One of the Grade 2 nurses in the surgical ward, who was part of the core team, noted there was 'pressure on staff to get patients out all the time'. This put a lot of stress on the morning staff.

She also commented about the inability to do work on the lean project during normal hours. She tried to do some of these things at work, but that it was often hard to find time as it was busy on the ward. So she took home the work for the project.

A NUM in the medical ward, who was part of the core team, also commented about how difficult it was to work on the project in normal hours saying that she did not have spare time to research and collate data.

Releasing Time to Care

Measuring the amount of direct nursing time spent with patients was also problematic.

A pre-LW (Lean Ward) time audit was done at a single point in time by following a single nurse for a shift. This was repeated with another single measurement

point nine months later after his ward had completed the basic phases of the LW project. There was a slight drop from 43% to 39% in time with patient which the NUM in the medical ward considered statistically insignificant. More importantly, he was critical of the measuring methodology in the context of a dynamic ward that is constantly changing, since this was not taken into account in the pre-and post-measurements. He argued that making such comparisons could only work if it is done at the same time of day with the same type of patient in the ward. He gave an example of how the level in time spent with patient would increase markedly, if the patient needed to have a lot of antibiotics.

The surgical ward audit also failed to demonstrate any statistically significant change in level in time spent with patient. More, subjectively, in the experience of the nurses interviewed, they either didn't think that there had been any change as a result of the LW package or simply didn't know.

If any time was freed up, how it is spent is a contested issue. While nurses may desire to spend more time with their patients, under conditions of high work intensity with a high proportion of their work spent on non-direct patient care, how they spend this time is constituted by the actual labour process.

The hospital operates within a highly monitored audit culture, and as noted previously, it was the senior nursing manager's *hope* that any released time would be used in non-direct patient care by filling in the audit forms. Hence the discretion of nurses in how they use any 'released time', if the Lean Ward project had actually achieved this, is compromised.

Sustainability

A range of changes such as the tidying of the wards and the continually updated patient status board (which was upgraded to an electronic board, automatically populated by patient data collected in the Emergency Department by a new hospital patient information system) were obvious achievements.

Loss of Momentum

However, it was apparent that even changes like tidying the ward needed conscious effort to maintain. A NUM in the surgical ward, who was a member of the core group and directly involved in rearranging the stores, commented that there was a need to revisit it to keep up the momentum. She also noted that the turnover of staff who had been involved led to it falling off.

Another NUM in the surgical ward commented that the demands of patient care tended to distract staff from keeping things tidy and restocking. She noted that the acuity of the patients and constant admission and discharges of patients meant that time needed for restocking was not there.

This view was supported by the NUM in the medical ward, who was also part of a core team, indicated that it had been 'maintained partially'.

It is the authors' opinion that, at best it could be argued that getting the stores back to an optimum level of efficiency was a lot easier given the changes brought about by the Lean Work project.

Patient Medications

Another module addressed was patient medications. Patients' medications are normally kept in a locked draw at the bedside. These were often not properly replaced, resulting in staff in the medical ward repeatedly going to pharmacy to replenish individual patient medications. The core group developed a medications form which was attached to the clipboard for staff on the morning shift to check the patients' medicines, then record what medications needed replacing, with the afternoon shift tasked with restocking the drawer.

However, given the work pressures and the need to write up patient notes at the end of shift, the morning staff did not always fill the forms. A Grade 2 nurse in the medical ward, who was part of the core team, indicated that that she could still go to a drawer and find half the medicines were missing.

While there was (in principle) support for the change - which would reduce the number of trips that nurses made back and forth to pharmacy - even this ward based audit had little success due to routine work pressure. Such pressure provided little space for compliance or time to develop the practice into a habit.

Auditing Ward Performance

Another phase of the lean project was to audit how the wards were going. This included audits of the time spent with patients, as discussed above.

The audit work was undertaken by the Quality Improvement staff. The NUM of the medical ward found that having the resources to do audits was a problem.

One example was the audit supported by the BCOP program, which freed up a staff member for a day a fortnight to work on an aspect of care of older patients. The project he undertook was to audit the extent to which such patients were eating their meals. The audit revealed that 40 per cent were eating less than 50 per cent of their meals. As a result, changes were made to the time and way meals were delivered, using the tool for problem solving available from the Lean Wards toolkit. However, the NUM was concerned to audit whether the level to which older patients were eating their meals had actually improved. Unfortunately the staff member, who had done the audit, was away and by the time when he returned there was no further funding available for the project to be continued.

Another example of too-limited resources was that although observation equipment was now readily accessible by staff, the NUM in the medical ward had not been able to audit whether the observations were being done at the right time.

Later Phase of the LW Project

Part of the later phase of the project was the development of a discharge checklist undertaken by a junior nurse in the core team helped by an NUM. However, this was used quite variably by staff.

The NUM on the medical ward reported that they had come up with the discharge checklist on a piece of A4 paper, but as a senior staff member he would not use it because he had the information in his head.

In this situation the value of the checklist was primarily to support more inexperienced staff, since experienced staff could rely on their well-rehearsed habitual practices.

LW Project Results

With regard to the views of the two NUMs - about where they had reached with the lean project - they largely had the same conclusion. The NUM in the medical ward said that:

I think we have plateaued at the moment ... I think it is partly situational ... from a few key people that I need to move not being here at the moment.

The NUM in the surgical ward commented that:

And the rest [the rest of the lean project besides tidying up] is also good, but I think the sustainability of it is -is difficult.

Conclusions

The experience of the Lean Wards project clearly shows that the motivation for the project was heavily focussed on bottom up involvement by nurses in the improvement of patient safety.

The Director of Nursing was strongly concerned about hospital wide issues of quality and safety of patient care. The Director of Nursing also expected that the project could free up nurse time to care for patients as well.

The two Nurse Unit Managers also focussed on improved quality and Safety of Care through better auditing and checking of patients. The more effective carrying out of existing hospital protocols about falls, pressure ulcers, correct medication, observations such as bowel movement, fluid balances was something they expected from the lean project. This was supplemented by the development of local checklists.

The involvement of all staff in the lean project was

achieved to some extent in the early stage of the process, where staff in the wards were asked what 'bugged' them and what they 'liked' about the organisation of the ward.

However, the major responsibility for the project as it proceeded fell to a core group of senior nurses supported by a couple of junior nurses, who were keen to be involved.

The reason for this lack of bottom up participation was a result of the pressures arising from the relentless challenge to admit and discharge patients as fast as possible.

These pressures occurred because of State Government policies to decrease the costs of running public hospitals by increasing patient flows.

The pressures to admit and discharge patients were most apparent in the surgical ward, but the medical ward to a lesser degree also suffered similar problems.

There was little or no capacity for nurses to work on the lean project in working hours and as a result those involved had to do the data analysis and presentation and development of checklists in their own time.

Beyond the original training no attempt was made to backfill staff so they could work on the project. The lean project occurred in a hospital which had a history of encouraging staff to pursue post-graduate education and to undertake projects on patient quality issues for personal development out of normal hours. The demands of the lean project added to these existing demands on staff time.

Another key finding was that the measurement by central quality management staff of how a nurse spent her time during a shift and what percentage of that was

with a patient did not significantly change from the start of the project and nine months later. Such statistics should of course be treated with care, because it is not possible to hold constant the acuity of patients which could vary on any given week from very ill to a number being ambulant and in less need of care.

The analysis of findings also revealed that, even where there were forms or checklists created largely by a core group of staff, there were also problems for busy staff in carrying out these procedures.

Similar to problems about compliance that faced top down protocols, so too there were problems experienced by those forms and checklists generated at the bottom due to work pressures.

Hence, it cannot be argued that like the factory workers discussed by Adler (2012) that nurses internalised a managerial control system and practiced it on themselves.

Finally, it should be noted that the two wards studied had a previous list of initiatives to improve patient care, which were developed in the ward and there were issues such as patient discharge, which were already well handled in the ward. As a result, whether different parts of the Lean project were carried out depended on the *stage of development* of the ward.

Although there were some positive gains from the project, it was apparent that over time the effort to continue the Lean project had lost momentum.

Reference

Adler, P. S. (2012). The ambivalence of bureaucracy: From Weber via Gouldner to Marx. *Organization Science*, 23(1), 244-266

An IIE – EEA IE Training Course initiative:

MODAPTS: Work Method Time Measurement and Improvement

The first course to be offered is on the MODAPTS work measurement system in setting time standards.

MODAPTS stands for Modular Arrangement of Predetermined Time Standards. Easily understood by employers, unions and employees, it provides standards that are transparent due to having the tasks constructed in such detail and accuracy. This feature of MODAPTS is so important as it avoids conflict from non-acceptance of standards.

MODAPTS is different from other systems in that it provides time elements for normal body movements rather than distances moved or the objects being handled.

The textbook “Heyde’s MODAPTS” will be used as part of this course. Each participant will receive a copy of the text book as part of their registration.



Industrial Engineering Society

Target Audience

This course is for:

- Industrial Engineers
- Managers, Accountants
- Team Leaders and
- Union Officials.

Course Outline

Day 1

- Work Measurement & Time Standards
- Time Study – Rating - Allowances
- “MODAPTS PLUS” & “MOD++” using the icons

- Overview –“MODAPTS PLUS” Coding and Data.
- Simple Operations – Movements, Gets and Puts
- Rest / Recovery Allowances
- Exercises – normal times for simple operations
- “Finger” Control vs “Hand” Control
- The “MOD++” Program

Day 2:

- “Hand Control” – heavy / bulky articles
- Clerical Activities – Data & Exercises
- Hand Trucks / Forklifts Data & Exercises
- Exercises – Teams of Two
- Review Team Exercises

Manual: “Heyde’s MODAPTS”

Presenters: Mike Jones and Damian Kennedy (registered MODAPTS instructors)

Course Objectives

Participants can expect to be able to confidently generate accurate standards using the MODAPTS system.

- Provide a clear understanding of the MODAPTS system.
- Benefits of MODAPTS compared to other systems – stopwatch studies.
- Ability to set standards that are fair and accurate.
- How to use MODAPTS as a tool to provide suitable work for employees with disabilities and/or those returning to work on light duties.
- How to use MODAPTS as a modelling tool by simulating new or revised procedures/tasks and comparing them to the current.
- Guidance in setting up the data such that block data can be developed and used to develop quick yet accurate standards.
- Emphasising the benefits of MODAPTS in ensuring consistency in the standards set by various Industrial Engineers within the company.

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