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## Approaches to metrication

### Pat Naughtin

I am fortunate in that I have been closely involved with several successful, smooth, and rapid metrication transitions. I have also observed inefficient, bitter, and painfully slow attempts at metric conversions – many of which are still continuing after more than thirty years.

Based on these experiences, my overall belief is that metrication is inevitable in all nations and in all industries.

So, in discussions about the metric system I am always confident that metrication will happen. I report on how I have seen metrication happen in the past, and about how I think that metrication will happen in the future. I never doubt that metrication will happen – I regard that as a given.

I am also quite comfortable with the idea that it is OK for us all to use the best, fairest, and simplest, system of measuring units ever devised by humans. It is my absolute belief that the metric system is – as the philosopher Condorcet famously said,

**'For all people, for all time'.**

Recently I was challenged by several writers to the email list of the United States Metric Association to clarify my approach to metrication. As I was thinking through this I realised that there are four distinct approaches to this subject, and that I only ever use one of these.

### Four approaches to metrication

Recently, I examined a 'Sizing Chart' for men's clothing. It stated that it consisted of two parts: one where 'Measurements are in inches' and another where 'Measurements are in centimetres'.

It looked like a bit of a measurement muddle to me until a quick examination revealed that all of the measurements were really inch measurements converted to over-precise centimetre values (to two decimal places!) for the 'Sizing Chart'.

It was while I was thinking about this strange way of running a business that it occurred to me that there have been four main approaches to metrication, and that this clothing company is using one of these four, 'Approach 3', below.

## **Approach 1**

Keep all design and manufacture in old measures and communicate with the public in old measures.

I used to know a small company in Geelong that made rainwater tanks using this technique – they are no longer in business; and another Australian company that made industrial sheds – they are no longer in business either. I now don't know of any other companies that have consistently tried this approach and are still in business in Australia.

Whatever your situation, it is now probably impossible to 'Do nothing' or 'Ignore it, and it will go away' in the early 21st century – the metric system is already everywhere in our lives – for a discussion on this in the USA go to: <http://www.metricationmatters.com/articles.html> and download the article, 'Don't use metric'.

## **Approach 2**

Do all design, processing, and manufacture in metric units and then communicate with the public in old pre-metric units.

For example, most worldwide automotive companies design, build, and market in metric measuring units only. However, the automotive industry in the USA designs body parts in millimetres and engine parts in micrometres, builds to this precision and then sells to the public with a 'mph' speedometer, 'ml' odometer, 'in.' tyres with 'psi' pressures. Although a car might have its 10 000 parts measured some 100 000 times using only metric units, the four labels, 'mph', 'ml', 'in.', and 'psi' are all that is needed to convince many drivers in the USA that they are driving an English units car and that all is for the best in this English units world.

Road makers in the UK use this approach. Roads are designed and constructed in kilometres and millimetres and then labelled (signed) with posts marked with miles, half-miles, quarter-miles and yards. Again, many members of the public believe that they are driving an Imperial units car in an Imperial units world.

The world gold industry mines in tonnes, refines in grams, and milligrams, and then reports sales to the public in Troy ounces. Some nations take this further when they mint coins in Troy ounces; an example is the Krugerrand in South Africa.

The world oil industry drills in millimetres and metres, extracts in litres and cubic metres, sells in kilograms, and then reports the selling prices to the public in theoretical barrels that never existed.

On a recent visit to the USA I noticed that many companies use this approach. They do all of their planning, purchasing, and processing using metric units then change to old pre-metric units for their customers when they write the invoices. Many companies seem to lack the courage to admit that they are actually using the metric system in their internal work. I call it 'dumbing down at the door'.

### **Approach 3**

Design and manufacture in old measures and then use conversions — almost always soft conversions that are too precise — to communicate with the public.

This is the approach taken by the clothing company mentioned above with their clothing sizes. It is an attempt to convince the public that the company is progressively metric while not having to spend a single cent on retraining in the factory because there they are still using inches (and more rarely half-inches and quarter-inches) for all of their design and garment making.

This is also the approach taken by the menswear industry in Australia. For example, a 38 inch jacket is designed, cut, and made to inch precision, then labelled as 97 centimetres implying centimetre precision.

### **Approach 4**

Plan, design, and build in metric units, and then communicate with the public in metric units.

This is the simple, easy, and effective approach taken by Australian builders, carpenters, electricians, fitters, furniture makers, machinists, gasfitters, plumbers, welders and many others who design, build, and communicate with the public in millimetres. In some cases metrication in these Australian industries took less than a month and produced increased annual profits of between 10 % and 15 % each year, and have since the mid 1970s.

As an example of the use of this method — but in a parallel field — linguists use a technique called 'total immersion' where all communication is done in the new language without translation to the learner's present language; this technique is used to teach foreign languages effectively and quickly. In a sense Approach 4 is the measuring equivalent of 'total immersion'.

This is the approach to metrication that I use and recommend, it is based on my close observations of successful metrication in a range of industries over 35 years.

### **Combined approaches**

Although it is easy to identify the four main approaches to metrication and to identify many companies and industries that use each approach, it is sometimes more difficult to classify groups who have chosen — mostly by default — to use somewhat messy combinations of these four approaches.

Consider the cost of the confusion at Kodak where the film division used Approach 4 to complete metrication in the 1910s while the photographic paper division is still puddling along with a sort of combined Approach 1 and Approach 3 in 2005 — 95 years later — and they've still got a long way to go.

You might recall that NASA in the USA lost the Mars Climate Orbiter at a cost of about 1200 million dollars because they confused old measures with metric measures. I won't comment on NASA's measurement practices, except to suggest

that various parts of that organisation are using all four of the above approaches, often in conflict with each other.

## Timing

The timing to complete metrication using each of the four main approaches is interesting:

**Approach 1** -- never, the muddle continues.

**Approach 2** — metrication is completed internally in the industry within a few years, but the public conversion is designed not to happen until metric measures have developed to a point where it is OK (morally right?) to discuss metric measures in public. This could take a couple of human generations or a minimum of (say) 50 years.

**Approach 3** — very slow conversion will take place as a back-conversion from the company's public 'metric' position. Typically, you could expect this type of conversion to take at least 100 years.

**Approach 4** — quick and easy metrication, with a time of less than a few months being possible, and less than two years being typical.

## What to do about your own metrication

Fortunately you can avoid all the pitfalls above by following a few simple suggestions. I know that planning for an efficient, smooth, and fast metric transition always includes variations on these five ideas:

- ◇ Use the total immersion technique. Devise your metrication programs so that you avoid all conversions — use SI metric units only. Make sure that everyone involved is part of the process — be careful that you don't allow pockets of resistance to develop.
- ◇ Devise practical activities in your training programs so that people can and will have successful experiences using 'metric only' rulers, tapes, dials, and gauges. Deliberately make the tasks easy so that success is absolutely assured. Choose tasks that show the simplicity and ease of use on metric measures.
- ◇ Consider the differences between a metrication program and a metric conversion — these are quite different things. Metrication can be dramatically fast while metric conversion is always slow. I think it is best to avoid metric conversions at all times. Beware of hidden conversion charts in desk drawers, inside locker doors, and pasted to the underside of shelves as these can remain hidden and they can delay a smooth metric transition for years. I once found a box in a textile mill where a weaver had collected every conversion chart that they could find (over a hundred pages) to avoid changing their mindset from this grand miscellany of old measures to one simple metric unit — milligrams per metre.

- ◇ Choose units for your business in such a way that you remove fractions from your work altogether. This means vulgar fractions (1/2, 1/3, 1/5, etc) and decimal fractions (0.1, 0.12, 0.123, etc) have to go. If you are wiring a piano, you could choose to use micrometres for diameter rather than the hodge-podge of gauge numbers on offer. If you are a carpenter, you could choose to work in millimetres with an occasional use of metres – but you will not use centimetres. (Note: This technique was used by the Australian building industry to successfully change to metric units in less than a year.)
- ◇ Develop 'Rules of Thumb' and reference measures before you publicly begin your metric transition. For example, if you wish to manage a temperature transition in a hospital, you might place posters that say:

<b>Temperature</b>	
37 °C	Normal body temperature
38 °C	Low fever
39 °C	High fever
40 °C	<b>Dangerously high fever. Seek emergency medical treatment immediately!</b>

Or if you wanted to change the recording of baby mass your poster might read.

<b>Baby mass</b>	
2500 grams	Small baby
3500 grams	Average baby
4500 grams	Big baby

## The future of metrication

The metric system is a system. I know that this sentence sounds silly on its own, so let me compare the metric system with the old pre-metric measuring methods that were never planned, and were never intended, to be systematic.

Old pre-metric measures were made up locally from many different crafts and trades and they were mostly intended for quite specific applications, many of which are no longer in use. These old measures have always been subject to regional variations and they have always been characterised by a rich variation of size ratios that were invented with them – and many later attempts to rationalise them have yet to be successful.

On the other hand the metric system was invented as a coherent coordinated system where all the component parts are designed to operate together to make the metric system easy to work with – in both measuring and in calculating.

My favourite is that a millimetre of rain on a square metre of my roof puts a litre of water in my rainwater tank — whee!

People who purposely choose to use old measures usually do so because they are reacting to the social environment in which they were raised and in which they currently live. They are greatly influenced by the examples around them of other people who use old pre-metric measures. Mostly these people have yet to have their own personal experiences with the ease of using metric measures — they have yet to understand the inevitability of an all-metric world where they will enjoy the many advantages of the metric system.

Mixing metric system units with old pre-metric measures dramatically delays the eventual acceptance of the metric system as our prime system of measurement, as the advantages of metric are not properly realised. Mixtures also encourage the use of metric conversion methods that have shown themselves to be painfully slow.

I believe that the metric system, and in particular its most modern version (the International System of Units — SI), is such an improvement over the ways we measured previously that it makes its eventual acceptance throughout the world inevitable.

I suspect that an overwhelming majority people in the UK and the USA currently believe that in the future they will be predominately metric in the way they carry out their personal and commercial dealings. Most don't doubt that this position will definitely be reached in (say) 100 years, by the year 2105; many think that it will take 50 years, by 2055; and there are others who hope that this can be achieved in 5 years, by 2010. I think that all of these will be correct for some people at some time; it will depend on which of the 'Four approaches to metrication' that they choose for their own metrication process.

Whenever you are considering the future of the metric system — anywhere in the world — don't ever doubt that metrication is inevitable. No individual, no group, no company, no industry, and no nation that has ever used metric measures (and especially SI units) for some time ever goes back to using old pre-metric or pre-SI measures.

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For help with your metrication program you can contact Pat Naughtin at [pat.naughtin@metricationmatters.com](mailto:pat.naughtin@metricationmatters.com) and you can see more details of his services at <http://metricationmatters.com>