

# SAPPMA

southern african plastic pipe manufacturers association



**Ian Venter**

**KEY MESSAGES**

**22 October 2020**

**SABS**

**ISO**

**NSF**

**cen**

**AENOR**

**bsi**

**DIN**

**SATAS**

**SAPPMA**

**QUALITY WORKSHOP V**

# SAPPMA Quality Workshop V

## Key Messages



Co-presented by:  
Alaster Goyns  
Jacques Van Eck  
Renier Snyman

Ian Venter

22-07-2020

22-10-2020

**SAPPMA**  
SOUTH AFRICAN PLASTIC PIPE MANUFACTURERS ASSOCIATION

# SAPPMA Quality Workshops



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# Key Messages -Unlocking the Potential

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# Safeguarding your assets

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# Key Selection is Crucial

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# Presenters

SAPPMA Quality Workshop V



22 October 2020



Renier Snyman



Jacques van Eck



Ian Venter



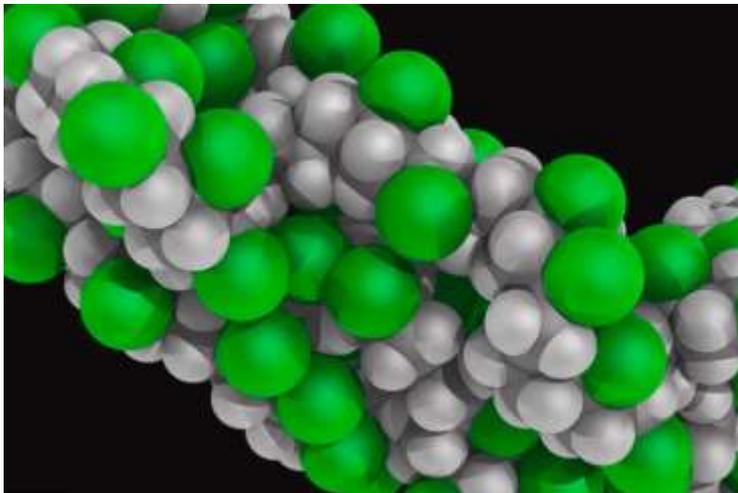
Alaster Goyns



# Quality PVC Formulation and Mixing



Renier Snyman



Key Messages: Quality PVC Formulation &  
Mixing  
October 2020



Renier Snyman

# AGENDA

- Importance of choosing the correct ingredients
  - Filler
  - TiO<sub>2</sub>
  - Stabiliser
  - Lubrication
  - Impact modification of PVC-m
- Critical mixing parameters
  - Filling
  - Equipment condition
  - Hot mixing temperature
  - Cooling and its effect on extrusion
  - Different mixers, different dry blend quality?
  - Using recycled material
  - Double batching
- Summary and Questions



# Formulations

- The first step in manufacturing a good PVC pipe is formulating
- Choosing the correct ingredients, in the correct dosages, is critical
- There are many cheaper grades of raw materials on offer
- Although suppliers may claim they are similar to more expensive grades, this is not always the case
- A process of evaluation, which may include lab work and production trials, is needed to assess how cheaper alternatives perform
- Remember that PVC pipe has a long life span, therefore assessment should include long term performance of additives

# pvc

formulating is like cooking  
(Just don't lick the spoon)



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# Formulations: Fillers

- Common fillers used in PVC include:
  - $\text{CaCO}_3$  (general purpose filler – popular)
  - $\text{TiO}_2$  (UV and whiteness)
  - Calcinated clays (wire / cable formulations)

## CaCO<sub>3</sub> Advantages

Reduces formulation cost

Improves melt stiffness

Reduces product waviness

Increases pipe hoop stiffness

Nucleating agent for AZO foaming agents (particle size)

## CaCO<sub>3</sub> Disadvantages

Increases yellowing with higher dosages

Increases brittleness (particle size)

Increases product SG and mass/m

Contains hard components increasing wear

Uncoated grades have excessive oil adsorption

Increases melt pressure in the die

High Fe content causes yellowing with Ca/Zn stabilisers

# Formulations: Calcium Carbonate

- Particle size is critical. Smaller particle size will
  - Reduce wear on processing equipment
  - Have a smaller negative effect on product properties, especially impact
  - Have higher absorption, due to larger surface area
  - Tend to agglomerate, making dispersion more difficult
  - Can cause  $\text{TiO}_2$  to agglomerate, leading to white streaks in the pipe
  
- Coating the filler with a fatty acid will
  - Improve dispersion characteristics of the filler
  - Reduce adsorption onto the filler's surface
  - Improve dry flow characteristics
  
- $\text{CaCO}_3$  is mined from limestone and has an SG of 2.7 – 2.8
  - This is double the SG of PVC resin
  - Adding more  $\text{CaCO}_3$  therefore increases product weight per meter



## TiO<sub>2</sub> Advantages

Rutile grades are good UV stabilisers

Surface treated grades have low oil absorption and resists migration

Rutile grades have high refractive index = good whiteness

Choice between chalking, semi-chalking and non-chalking grades

Chalking grades have improved long term whiteness and lower yellowness

## TiO<sub>2</sub> Disadvantages

TiO<sub>2</sub> is expensive, especially chloride process rutile grades

Dispersion is difficult, tendency to agglomerate

Anatase grades have poor UV and can aid photo-pinking / greying

Chalking reduces gloss and produces white powdery residue

Chalking grades not recommended for coloured products



# Formulations: Heat Stabilisers

- Stabilisers impart heat/shear resistance to PVC for processing and post-processing
- Main Stabiliser types for rigid PVC includes:
  - Lead based stabilisers
  - Ca/Zn stabilisers
  - Organic stabilisers
  - Tin stabilisers



Property	Lead	Ca/Zn	Organic	Tin
Heat stability	Excellent	Good	Good	Excellent
Light stability	Good	Good	Good	Poor
Whiteness	Good	Good	Good	Good
Toxicity	Poor	Excellent	Excellent	Average*
Plate-out resistance	Good	Average	Good	Good
Price	Good	Good	Good	Poor
Accepted in local standards	No	Yes	Yes	Yes

\* Grade / type dependant. Some grades are food contact approved

# Formulations: Heat Stabilisers (2)

- Dynamic heat stability is influenced by shear (lubrication) and heat
- DHS is performed on a Brabender plastograph with mixer head at set temperature and set rotor speed
- Samples are processed for increasing times, in this case 3 min to 18 min
- Onset of discoloration is important, as it indicates where properties start to deteriorate
- Larger diameter, thicker wall pipes need more heat stability and different lubrication. Boosters can assist by increasing heat stability without a notable effect on lubrication

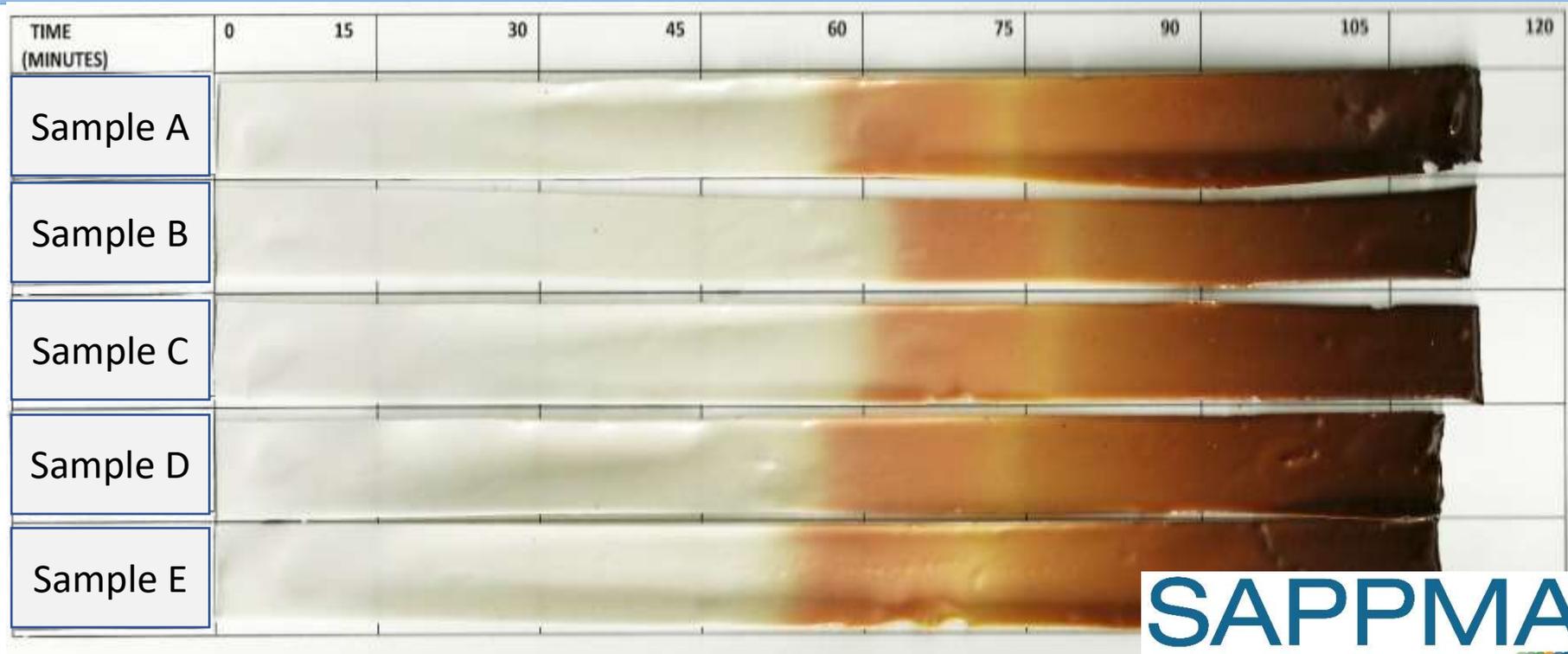
Dynamic Brabender Stability (180°C) – 40 rpm – 65 g

	3'	6'	9'	12'	15'	18'
Tin Stabiliser						
Lead Stabiliser						
Ca/Zn Stabiliser						
Organic Stabiliser (1 <sup>st</sup> gen)						
Organic Stabiliser (latest gen)						

# Formulations: Heat Stabilisers (3)

- Static heat stability is measured by applying heat only (no shear) to samples
- Samples are prepared by milling, pressing or extrusion
- A gear oven, like the Metrastat, slowly moves samples from the heated area
- This creates a time line of static heat resistance of samples
- Static heat stability is a good indicator of stability in an extruder head, where little shear takes place
- The time to the start of colour change is important

TIME (MINUTES)	0	15	30	45	60	75	90	105	120
Sample A									
Sample B									
Sample C									
Sample D									
Sample E									

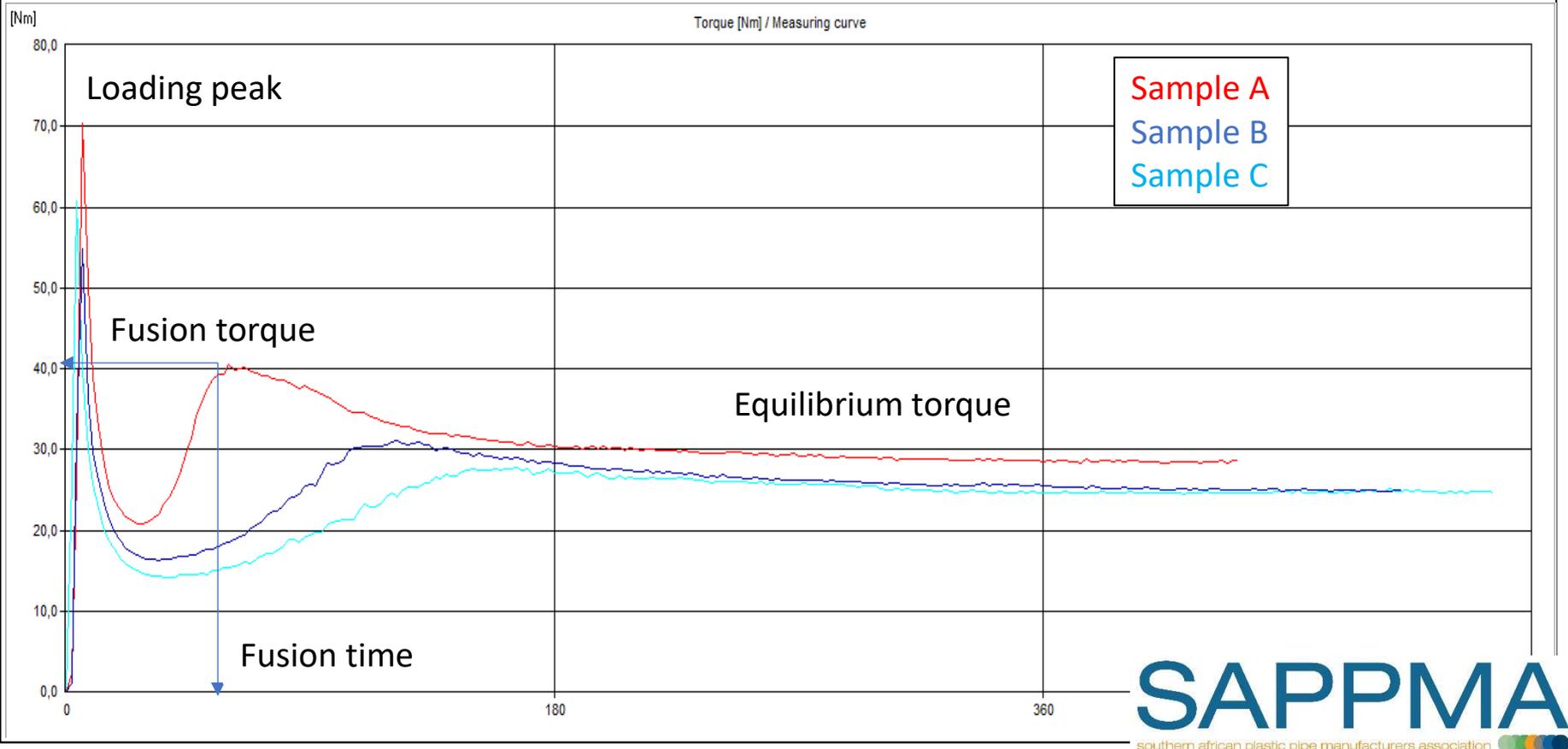


- Lubrication is critical to producing good PVC pipes at good output rates
- PVC-m pipe has a narrow processing window and needs precise lubrication
- Lubricants are classified into external and internal types. Some lubricants have both internal and external attributes

External lubricants	Internal lubricants
Non-polar	Polar
Reduce torque	Reduce torque
Increase fusion time	Little effect on fusion time
Decrease melt viscosity	Decrease melt viscosity
Improve metal release	Little effect on metal release
Increase haziness in clear products	Good for clear products
No effect on VICAT softening point	Can reduce VICAT softening point
No influence on pigment / filler dispersion	Promotes pigment / filler dispersion
F-T- and PE waxes are popular	Glycol- and fatty acid est

# Formulations: Lubricants (2)

- Lubrication affects the fusion time, fusion torque and equilibrium (running) torque
- The Brabender Plastograph gives a good indication of how stabilisers compare i.t.o. the above
- Brabender results are always comparisons. Actual values from different days should not be compared



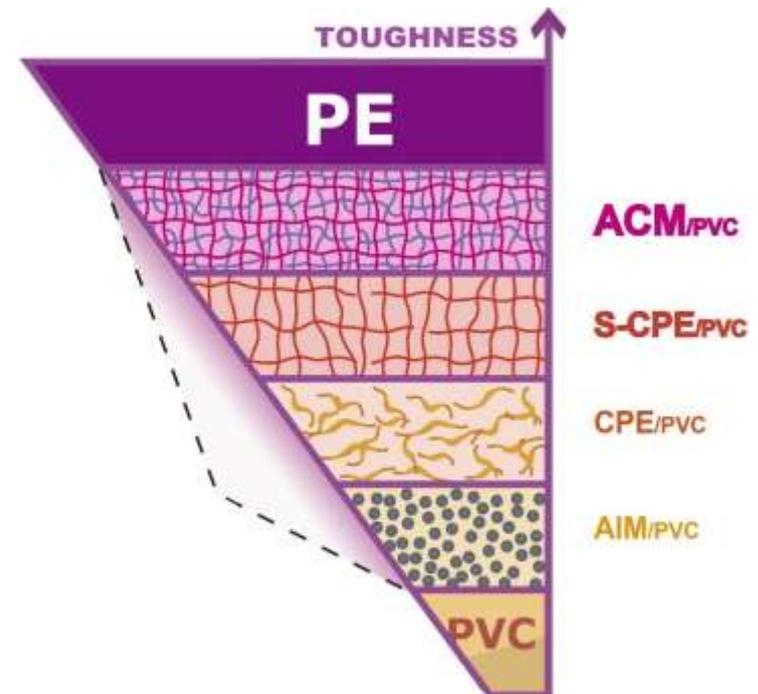
# Formulations: Impact Modifiers

- Impact modifiers are used to combat brittleness and improve toughness in PVC
- Various types exist:
  - Acrylic impact modifiers (AIM)
  - Methacrylate butadiene styrene (MBS)
  - Chlorinated polyethylene (CPE)
  - Acrylic CPE modifiers (ACM)

Property	AIM	MBS	CPE	ACM
Ductility increase	Small	Small	Big	Big
Tensile strength	Excellent	Good	Poor	Average
Cold temperature	Good	Excellent	Average	Good
Outdoor performance	Excellent	Poor	Good	Good
Effect on processing	Promotes fusion	Promotes fusion	Delays fusion	Delays fusion
Price	Expensive	Expensive	Cheap	Moderate

# Formulations: Impact Modifiers (2)

- For PVC-m pipe acrylics on their own do not improve toughness enough
- CPE on its own may reduce strength too much, resulting in pressure failures
- CPE and ACM needs some work / shear to form a network in the polymer matrix
- This is monitored by melt temperature (192 – 197° C)
- ACM combines favourable properties of AIM and CPE in one toughness modifier



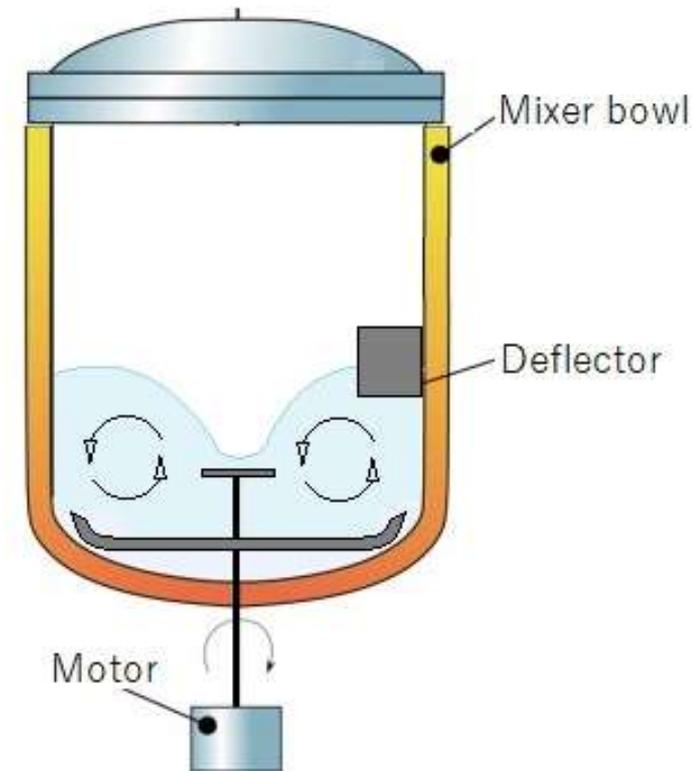
# Mixing

- Weighing and mixing are the first steps in making a good pipe
- Mixing is critical i.t.o. quality and output
- Mixing is the first value addition step of the pipe making process
- “One can make a bad quality pipe with a good mix, but one cannot make a good quality pipe with a bad mix” – Renier Snyman
- The following section deals with key factors of mixing



# Mixing: Filling

- The mixing process is divided into hot mixing and cooling
- The purpose of hot mixing is to melt down waxes and disperse additives homogeneously
- Hot mixers are designed not to be filled completely
- Hot mixers contain blades that swirl material at the bottom of the mixer and also deflects material upwards
- A deflector directs material down again, creating a vortex
- The vortex lets air into the powder, forming a fluidised free-moving mass
- Shear between the mixer and material, and between material particles, create heat that opens the pores on PVC grains and melt down waxes
- Hot mixing should be completed at minimum 110° C to allow waxes to melt and disperse
- If the mixer is over-filled, the vortex is disturbed, or eliminated; and no fluidisation is formed
- This results in poor dispersion and incomplete melt down
- Dispersion is a critical function of mixing



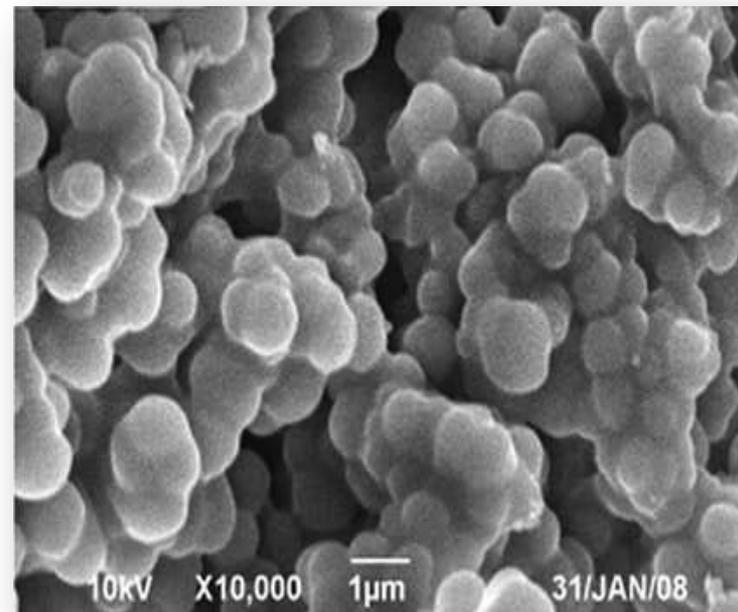
# Mixing: Equipment Condition

- Condition of mixer bowl and blades is critical to mixing efficiency
- Blades wear on outer edges first, reducing vortex and tip speed
- Worn mixer blades may go out of balance, potentially damaging bearings, etc.
- Blocked cooler labyrinth / channels lead to longer cooling times
- Thermocouples in the hot mixer need to function properly to avoid decomp
- Blocked / dirty filter bags on mixers lead to moisture build up, which can cause plate-out
- Inorganic additives are mostly responsible for high wear. These include calcium carbonate and titanium dioxide.
- Recycled material also increases wear



# Mixing: Mixing Temperature

- Various lubricants are used in modern stabilisers to perform different functions
- Low melting point lubricants melt quickly in the extruder to lower torque
- High melting point lubricants act further down the extrusion process, like the die head
- Melting these lubricants down greatly aids their dispersion within the dry blend
- Dry blend mixed to a low temperature tends to process inconsistently in an extruder
- Torque and melt temperature may vary more than usual, causing localised variations in gelation and properties
- Mixing time is also critical, as a short mixing time leads to poor dispersion

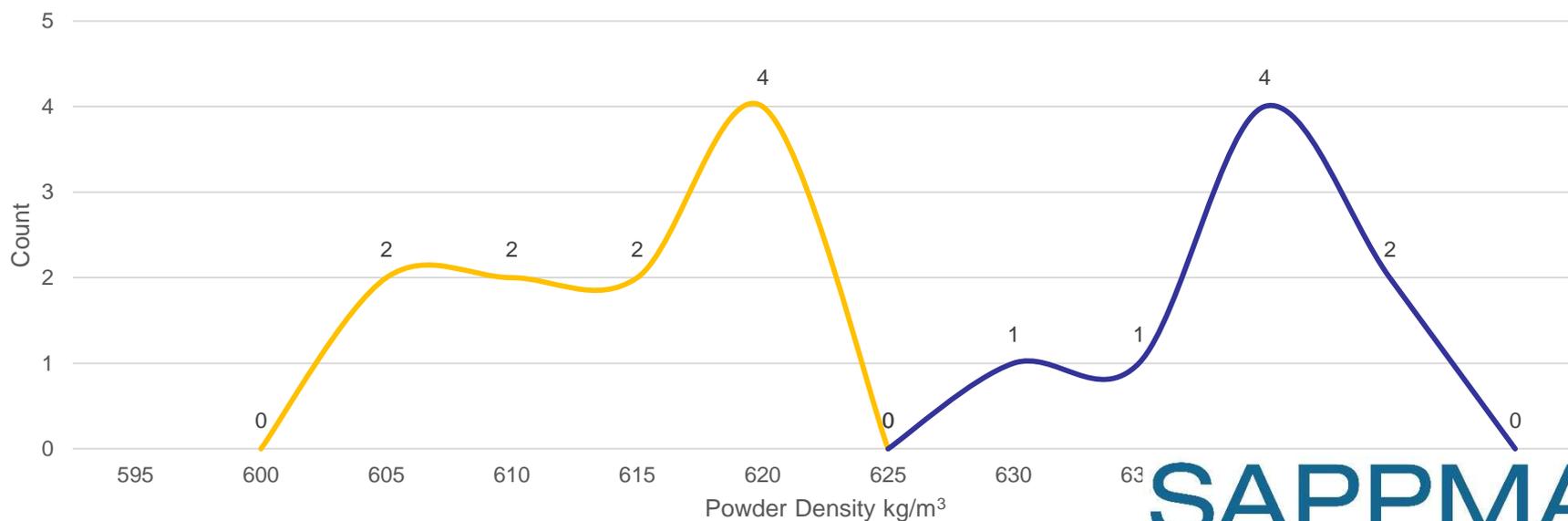


# Mixing: Cooling

- Hot dry blend needs to be cooled to avoid lumping
- Powder density is dependant on temperature
- Warm dry blend is less dense than cold dry blend
- Since extruders are volumetric, low density dry blend results in lower output
- Density can reduce by up to 10%, depending on delta t

Dry Blend Density - Histogram

— Day Shift — Night Shift



# Mixing: Different Mixers, Same Quality

- Mixing efficiency is measured with the Froude number, a dimensionless value
- The Froude number is calculated as follows:

**Fr = R x  $\omega^2$  / g** where,

- Fr = Froude number
- R = Mixer blade radius (m)
- $\omega$  = Angular speed in Radians / sec (1 revolution = 360° or 6.283 radians)
- G = gravitational acceleration or 9.81 m/s<sup>2</sup>
- The Froude number is influenced by mixer speed and blade radius, therefore blade wear can influence the Froude number of a mixer
- By changing the mixer speed one can change the Froude number. VSD drives can enable change of mixer speed
- Two mixers with similar Froude numbers will produce similar quality dry blends

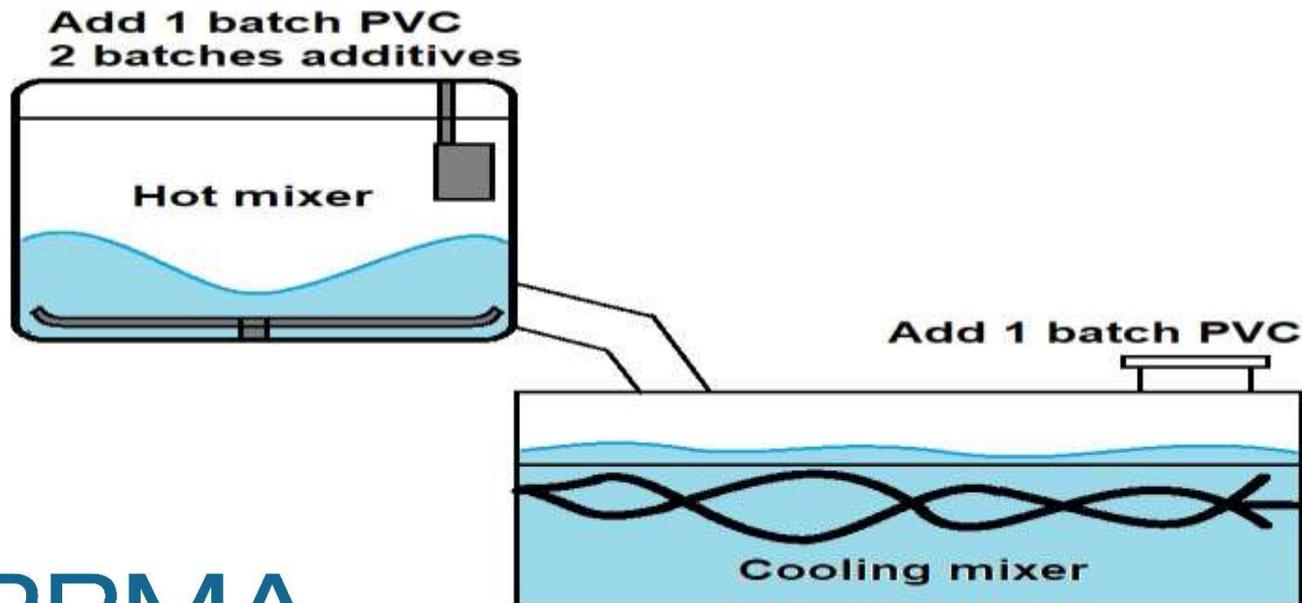
# Mixing: Recycled Material

- Before adding recycled material to any dry blend one must know **WHY** the pipe failed in the first place
- If the rejected pipe contained pin holes, discoloration or contamination it will probably reduce pipe quality, and contaminate good virgin dry blend
- Dispersion of recycled material, like any additive, is critical, therefore the smaller the particle size, the better. The limitation is heat generation during recycling
- PVC resin and most other additives have particle sizes  $< 250\mu$ , therefore recycled material has much larger particles than virgin material
- This may create dispersion problems and lowers the bulk density of the dry blend
- Recycled material has lost some stabiliser and lubricants during initial processing and recycling, therefore adding additional stabiliser with recycled material is a good idea
- Mix to standard temperature to allow lubricants to melt down and disperse
- Adding recycled material of a different formulation changes the loading of additives



# Mixing: Double Batching

- Double batching has been tried in order to increase the output of a mixer
- It entails adding double the amount of additives to a hot mixer and adding the 2<sup>nd</sup> batch of PVC resin to the cold mixer, once the mix has dumped
- This would effectively double the hot mixer output
- The cold PVC would cool the dry blend quicker in the cold mixer
- A major problem with double batching is that the PVC grains of the resin added to the cold mixer, do not swell or homogenise and absorb no lubricants
- No volatiles are driven off in the cold mixer
- This leads to inhomogeneous dry blend and quality problems in production



# Summary

- All additives have advantages and disadvantages to consider when planning to use them
- Choosing poor quality additives may lead to problems – “Cheapest is not always best”
- A Hot mixer should not be overfilled
- Parameters like mixing equipment condition, and mixing and cooling temperatures play a major role in dry blend quality and extruder output
- Mixer efficiency is gauged by the Froude number
- Different mixers can be adjusted to produce similar quality material by aligning their Froude numbers
- Take care in selecting recycled material and know its history
- Dispersion of additives is key to consistent dry blends, stable production and good quality

	<b>ngiyathokoza!</b>	<b>ro livhuwa!</b>
<b>dankie!</b>	<b>ke a leboga!</b>	<b>enkosi!</b>
	<b>inkomu!</b>	<b>thabisa!</b>
	<b>ke a leboha!</b>	<b>ngiyabonga!</b>
	<b>siyabonqa!</b>	

# Questions and Answers



**Renier Snyman**



# SAPPMA - Working for the plastic pipe industry (Audits)



Jacques van Eck

**SAPPMA**  
South African Plastic Pipe Manufacturers Association

**Factory Visit Report**

Site No:			
Audit Date:			
Company Name:			
Company Registered No:			
Postal Address:			
Physical Address:			
Site No:	Division:		
Department:	Name:	Title:	Signature:
Production / Factory:			
Manager:			
Technical / Quality Manager:			
Management Representative:			
Factory Size:	Production Volume:	Value:	
Employees:	Units Produced:	Value:	
Production:			
Classification:	Report #:	Author:	Sign:
SAPP 0001 SAPP 0002 SAPP 0003 SAPP 0004 / SAPP 0005 SAPP 0006 SAPP 0007 SAPP 0008 SAPP 0009 SAPP 0010 SAPP 0011 SAPP 0012 SAPP 0013 SAPP 0014 SAPP 0015 SAPP 0016 SAPP 0017 SAPP 0018 SAPP 0019 SAPP 0020 SAPP 0021 SAPP 0022 SAPP 0023 SAPP 0024 SAPP 0025 SAPP 0026 SAPP 0027 SAPP 0028 SAPP 0029 SAPP 0030			





# SAPPMA - Working for the plastic pipe industry (Audits)

Jacques van Eck  
22 October 2020



# Who is SAPPMA?



- The Southern African Plastic Pipe Manufacturers Association.
- SAPPMA is a voluntary, self-regulating association registered as a Section 21 Company in terms of the Companies Act of SA. It represents plastic pipe manufacturers and other stakeholders in the Industry.
- The purpose of SAPPMA is to create absolute customer confidence in the plastic pipe industry and to ensure the long term sustainability of the industry with top quality piping systems.



# SAPPMA's Main Focus

- Quality
- Standards
- Technical information
- Marketing
- Training

ISBN 978-0-626-33730-8

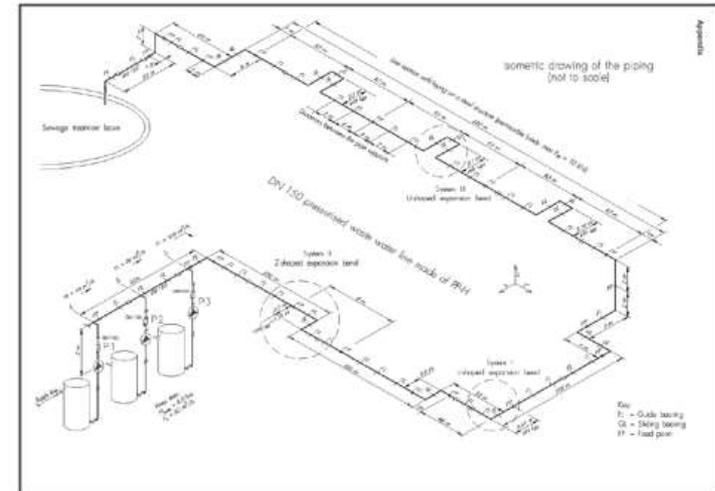
**SANS 16422:2016**

Edition 2

**ISO 16422:2014**

Edition 2

## SOUTH AFRICAN NATIONAL STANDARD



# SAPPMA Membership



**MR. STUBMAN**



# SAPPMA Membership



# SAPPMA Membership

**AENOR**

**bsi.**

**NSF**

NSF International

**SATAS**



# IFPA Membership



# SAPPMA Audits

- Not punitive, but...
- Twice per year – announced and unannounced
- Additional audits depending on market information
- Ensuring consistent quality



# SAPPMA Audits

- Elevating the industry standards
- Sharing technical information
  - Access to more than 100 product / testing standards
- Cost savings / Value adding



# SAPPMA Auditor

- Independent consultant - Quality assurance, welding inspections and failure evaluations
- CQI and IRCA Certified ISO 9001 Lead Auditor (BSI)
- Thermoplastic Welding Inspection certificate of competence (Plastics SA)





designing the product



Designing the experience



SAPPMA Auditor

Thermoplastic Piping Industry for more than 20 years

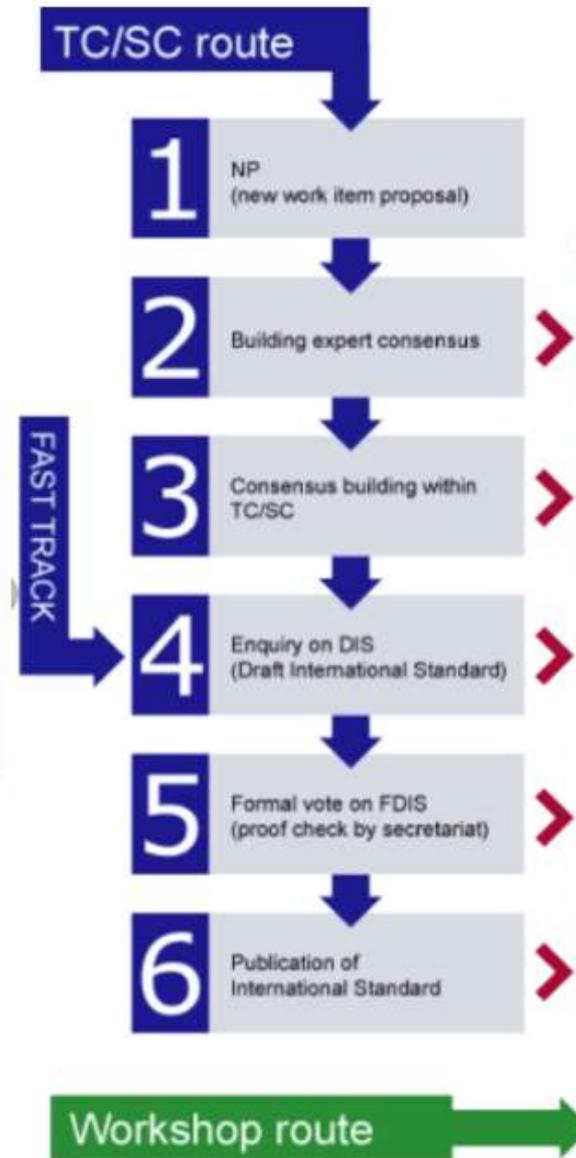
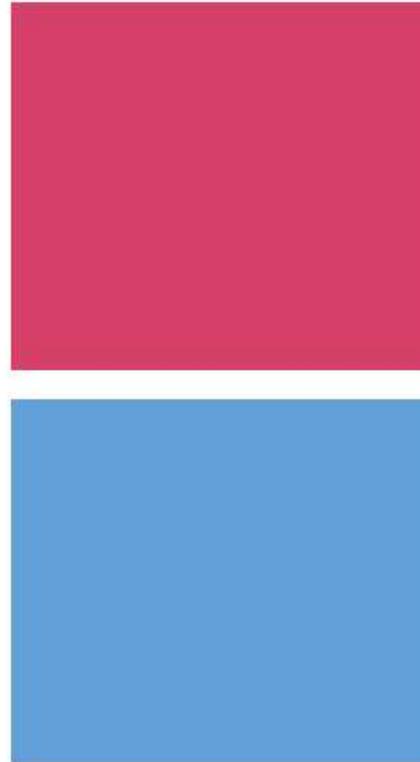
Familiar with international best practices in Thermoplastics

Experienced Sales and Product Manager (Pipe and Fittings)



# SAPPMA Auditor

- Business Management Diploma
- South African Bureau of Standards (SABS) Technical Committees
- SAPPMA Technical Committee



# SAPPMA Audits

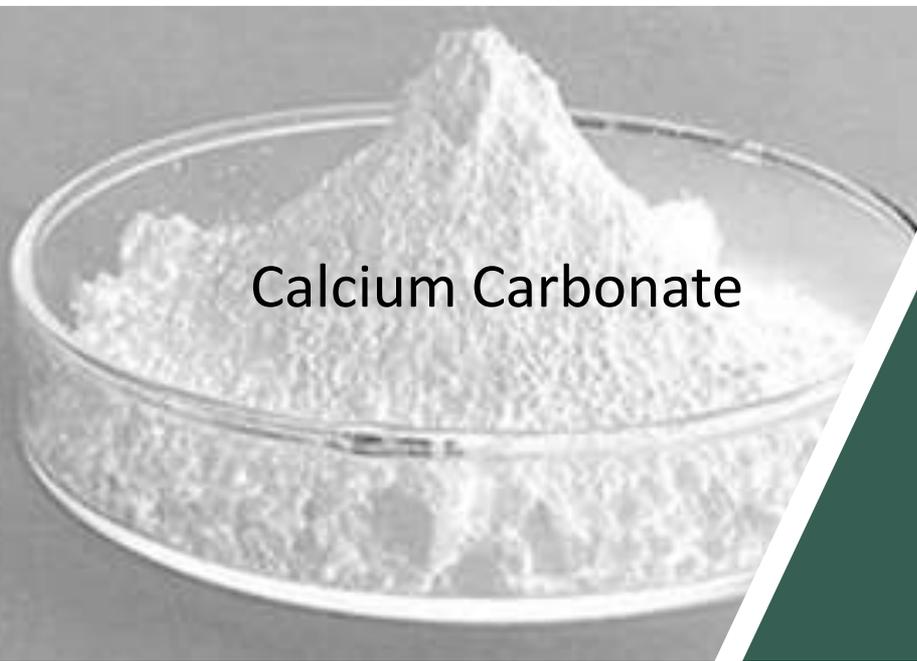
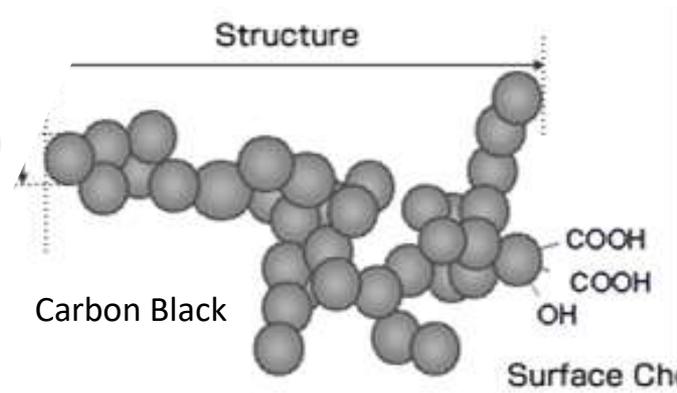
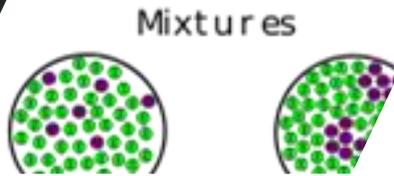
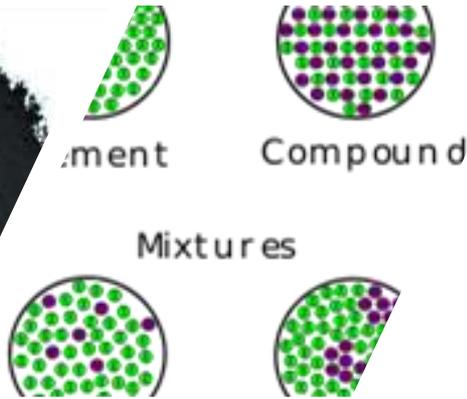
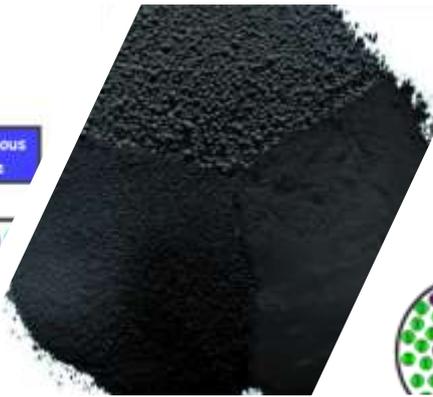
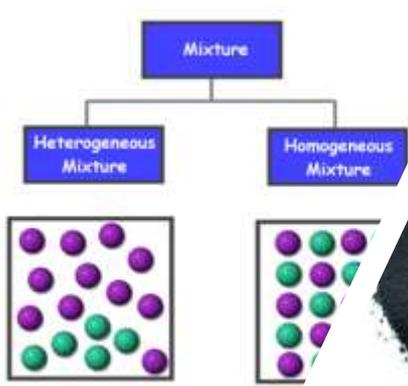
Follow an agreed upon checklist



- Note all permits and expiry dates
- Verify availability of national standards
- Check details of works orders / job cards



# SAPPMA Audits



Calcium Carbonate

Quality and control  
of raw materials  
PVC – Compounding

# SAPPMA Audits

- Production control and in-line tests
- Quality control
  - Equipment
  - Frequency
  - Operator
- Records



# SAPPMA Audits

- Markings
- Storage
  - Handling
- QMS (Quality Management System)
- Customer Complaints
- Previous findings





The SAPPMA mark: a guarantee of quality





Thank you for your ongoing support !



# Questions and Answers



Jacques van Eck



# Refreshment Break

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Refreshment Break

# Refreshment Break (3 Minutes)



Refreshment Break

# SAPPMA Quality Workshop v

## Key Messages from ISO 9001:2015



Presented by:

Ian Venter



# Putting ISO 9001 in Context

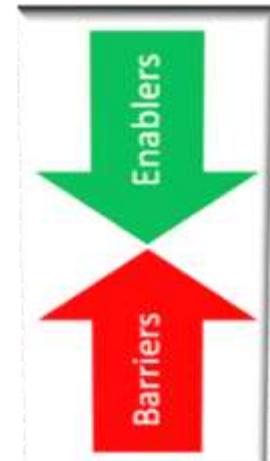
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Trade depends on the strength of the customer–supplier relationship, and this relationship survives through trust and confidence at each stage in the supply chain.



## Putting ISO 9001 in Context

- The intent of ISO 9001 is to enable an organization to demonstrate its capability and in so doing give their customers confidence that they will meet their needs and expectations and consequently build trust.
- The primary users of these standards are intended to be organizations acting as either customers or suppliers.
- ISO 9001 is not a quality management system, nor does it define requirements for an organization's products and services but is a set of requirements for a quality management system.



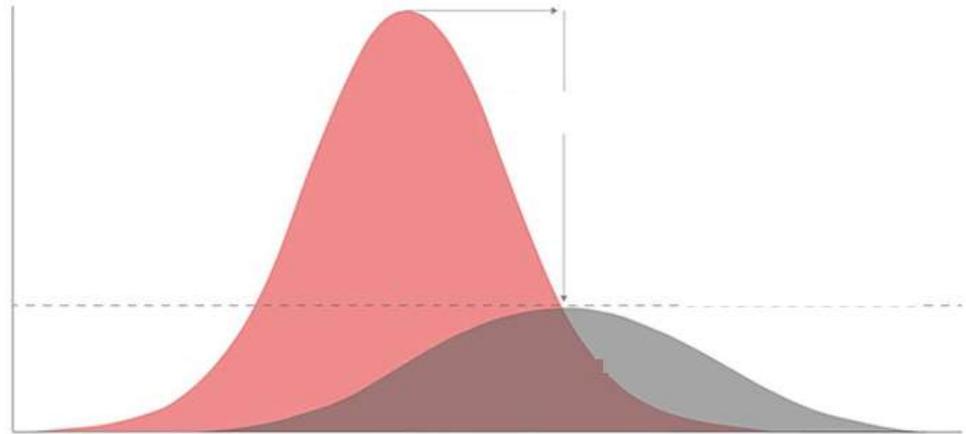


## Putting ISO 9001 in Context

- Conformity with ISO 9001 implies that every time a product or service is provided by the organization, it will meet the customer's needs and expectations, regardless of its specification because it has anticipated and taken account of those needs and expectations.
- Conformity with ISO 9001 also implies that should an organization satisfy its customers by meeting most of their requirements, it can be relied on to undertake continual improvement to meet all their requirements and thereby enhance customer satisfaction.
- ISO 9001 is intended to be used in contractual situations by customers seeking confidence in their supplier's capability, and therefore it is an assessment standard rather than a design standard.

# Putting ISO 9001 in Context

- ISO 9001 certification may be mandated in the directives of common markets where the free movement of goods and services is a condition of entry.
- ISO 9001 certification worldwide peaked in 2010 at 1.2 million with an average fall of 6% over the last five years.



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# Comparison between 2008 and 2015 editions

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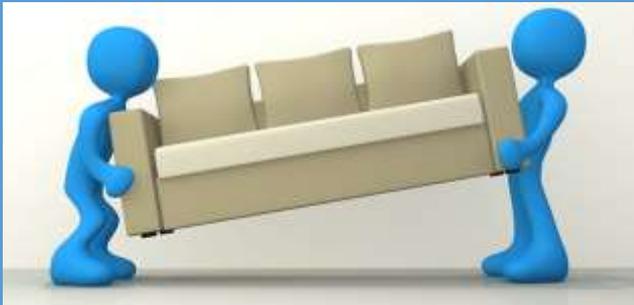
- The primary objectives of the revision to ISO 9000 and ISO 9001 were to develop a simplified set of standards that will be applicable to all types of organizations and for the documentation required to be more relevant to the desired results of the organization.
- Roughly 80% of the requirements of the 2008 version are embedded in the 2015 version.





## New requirements include those for:

- determining issues that affect the ability of the QMS to achieve its intended results;
- holding top management to account for the effectiveness of the QMS;
- integrating QMS requirements into the organization's business processes;
- promotion of risk-based thinking and the process approach;
- identifying and addressing risks and opportunities; determining the knowledge necessary for the operation of the organization's processes;
- planning of changes; considering the needs and expectations of relevant interested parties;
- implementing actions to prevent human error.



Requirements withdrawn include those for:

- documenting the QMS;
- documented procedures;
- quality manual and management representative.

# New concepts include:

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- documented information to subsume the previous concepts of documentation, documents, documented procedures and records;
- competence has been redefined to signify that someone who is competent must be able to achieve intended results;
- product is now referred to as product and service and used only to designate the organization's outputs;
- external providers replace suppliers.



## How the 2015 version has changed misconceptions

- ISO 9001:2015 is far less prescriptive than previous versions and this flexibility may change perceptions that it has been designed more for businesses than for auditors.
- Although variation is ubiquitous, it's not been mentioned in the standard since its inception; however, by introducing risk and hence uncertainty, variability has indirectly been introduced.
- ISO 9001:2015 now ties the QMS to the organization's purpose and strategic direction, thereby making its effectiveness judged by performance rather than conformance, and this should lead to there being more focus on results and less on following procedures.



# The ISO 9000 family of standards

- Although ISO 9001 specifies requirements to be met by the organization, it does not dictate how these requirements should be met.
- ISO 9001:2015 goes further than the 2008 version and creates a cycle of sustained performance, driven from understanding the organization's context through an extended system of managed processes to produce products and services that satisfy the needs and expectations of all stakeholders.



A large blue 'P' logo, partially obscured by a circular frame, with the text 'be manufacturers' below it.



## A practical guide to using these standards

- Before consulting any of the standards, either a need for improvement in performance or a need for demonstration of capability should have been identified and agreed with the senior management.
- These standards reflect the collective wisdom of various experts, but they will contain inconsistencies, they won't necessarily reflect the latest thinking, common terms may have an uncommon meaning and requirements cannot be treated in isolation as they are all interrelated.
- Whatever the statement in these standards, it is necessary to understand its intent (i.e. what it is designed to achieve). There is simply no point in following advice unless the consequences are fully understood.



Before you change anything, record a series of benchmarks that you can use later to determine how far you have progressed.



Implementation implies we pick up the standard and do what it requires. As the standards don't tell us to stop doing those things that adversely affect performance, these things continue. If the culture is not conducive for the pursuit of quality, these things will not only continue but also make any implementation of standards ineffective.



A far better way is to consult the standards, establish a system that enables the organization to fulfil its goals and then use ISO 9001 to assess whether this system conforms to the requirements.

# DEMONSTRATION - PERFORMANCE METHOD



- Changing a process simply to meet the requirements of a standard is absurd; there must be a real benefit to the organization.
- The goal should not be to meet ISO 9001 but to give the organization the capability to satisfy its customers.
- The process by which customers and certification bodies determine the capability of organizations to satisfy certain requirements is called conformity assessment. It is limited to the scope of the standard being used and thus is not intended to grade organizations on their capability. An organization either conforms or it doesn't conform.
- Demonstration of capability is often only necessary when the customer cannot verify the quality of the products or services during or after delivery.

- Quality should be a strategic issue that involves the owners because it delivers economic performance. Low quality will ultimately cause a decline in economic performance.
- No one will admit they don't believe in quality, but they will often disagree about how quality can be achieved.
- We need principles to help us determine the right things to do and understand why we do what we do. The more prescription we have, the more we get immersed in the detail and lose sight of our objectives – our purpose – our reason for doing what we do.
- Plan-Do-Check-Act (PDCA)
- Many dislike the word check because it is understood to mean “hold back” and not study and learn.



# Quality

- The word quality as used in the ISO 9000 family of standards is as the standard or nature of something as measured against other things of a similar kind. It is not about perfection but a degree of excellence.
- A product or service may not need to possess defects for it to be regarded as poor quality; it may not possess the features that customers expect for the price.
- The decision as to whether something is of satisfactory quality rests with the receiver, not the producer.
- The frequency with which the term quality is used in ISO 9001 has rapidly declined to avoid it being perceived as pertaining to the work of a quality department or implying perfection or excellence.

## Tip Of The Iceberg





# Requirements



It's often believed that a requirement is a condition that is specified when, in fact, the way the term is used in ISO 9001 it is as "a need or expectation that is stated, customarily implied or obligatory".



A requirement does not need to have been documented for there to be a requirement that has not been met.



There are requirements that relate to the product or service to be provided and requirements that constrain how those products and services are to be provided. The latter cannot be treated independently of the former.

- 
- There is little consistency in ISO documents as to whether the term QMS quality management system is being used in the sense of how entities interact to produce results, or in the sense of a set of methods for producing results.
  - As a result of basing industrial practices on scientific management, the term system has been used predominantly as an orderly way of doing something, and quality management systems have been perceived as a set of documents that tell people what to do.
  - Both processes and systems are not tangible; they are mental constructs or models and are convenient ways of observing things, but they are not reality.
  - What we include in our model is strongly influenced by how we see things, that is, our paradigm which embodies core assumptions that characterize and define our worldview.

## Management system



- By including in our model those elements that serve to create and retain customers we establish a representation of reality from the perspective of how the organization manages product and service quality.



# Process and the process approach

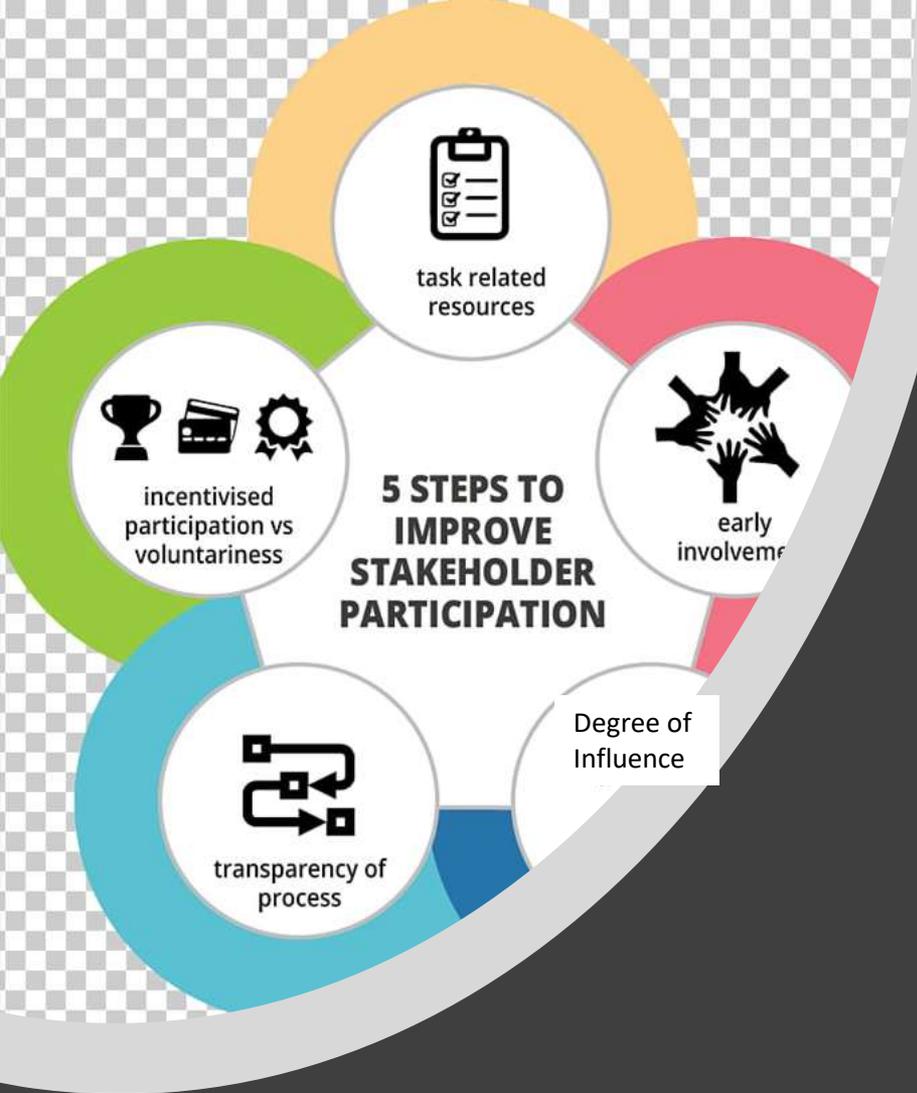
- In the first edition of ISO 9001 it was the word procedure that conveyed what organizations needed to document and implement to provide products and services that met requirements.
- In the 2000 version, it was recognized that outputs were more than the product of activities and the function that performed them, but a product of many elements combined in a cause-and-effect relationship.
- Managing a process is more important than implementing procedures or managing functions. In fact, who does what is of less importance than the results to be achieved and the process by which they are produced.
- Dividing results into the processes that will deliver them, rather than dividing work into specialties, is the essence of the process approach and it is the network of processes that holds the system together.



# Risk and opportunity

- Although there is no requirement for formal methods for risk management, the act of identifying, addressing and determining the effectiveness of the actions taken characterizes management.
- The term risk is commonly used to express the possibility of something bad happening but the ISO definition of risk as the effect of uncertainty poses the possibility that the uncertainty may be something good as well as something bad.
- Someone who is pursuing an opportunity may be taking a risk and someone who by their actions may miss an opportunity is taking a risk.





# Interested parties and stakeholders

- Interested parties include those from which the organization seeks support but also includes those which have a malevolent interest.
- Although interested parties have the freedom to exert their influence on an organization, before the advent of social media there was often little that one individual could do, but now they can take a complaint worldwide and destroy an organization's reputations in an instant.



# Understanding the organization and its context

- Every organization is affected differently by changes in the economy, markets, customer preferences, the natural environment, laws, scale of operations, uncertainties and their priorities.
- Organizations must look ahead to see where they are going and what may impede or facilitate progress towards enhancing customer satisfaction.
- Seeing the purpose of a business beyond the products and services it currently produces is more likely to secure its survival.
- Of all the alternative paths that could be taken to fulfil an organization's purpose, the one that is chosen is its strategic direction.





- A good diagnosis simplifies the often-overwhelming complexity of reality by identifying certain aspects of the situation as critical.
- Monitoring internal and external factors is on-going – it's not a one-off event.

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## Understanding the needs and expectations of interested parties

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- The needs and expectations of customers provide the basis for an organization's objectives, whereas the needs and expectations of the other stakeholders constrain the way in which those objectives are achieved.
- Relevant interested parties are those that could positively or negatively affect the organization's ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements.
- Organizations must try to understand better the requirements and intentions of their interested parties then deal with them ahead of time rather than learn about them later.

## Scope of the quality management system

- The scope of the QMS has more to do with the elements that are strongly influenced and controlled by the system than with which elements are exposed to certification audit.
- There are things that affect the outputs and outcomes of the QMS which the QMS can control and things that it can't control but needs to mitigate and only the former are within the scope of the QMS.
- It's important to know where the boundary of the QMS lies to minimize the relationships the participants in the system need to deal with.
- An organizational unit or process can only be outside the scope of the QMS if its performance can't be controlled by the QMS.





## Quality management system

- Don't confuse the system description with the system because all the documents people use to define and provide products and services that satisfy customers define the QMS requirements not the QMS.
- Establishing, implementing and maintaining a QMS is about creating a model of reality and using it to bring about changes that improve organizational performance and effectiveness.
- Without maintenance, any system will deteriorate.

# Processes needed for the QMS



The processes needed for the QMS are not QMS processes but business processes containing elements and interconnections that positively and negatively influence the quality of the system outputs.



Process analysis does not begin by analyzing activities or operations. It begins by defining the results to be achieved.



There are dangers in treating monitoring and measurement activities as separate processes because they may be made to serve objectives that have not been derived from the parent process objective.



Everyone should be aware of the processes in which they are engaged and be familiar with the actions, interactions and the supporting documented information.



Process outputs will include the tangible and intangible results produced in pursuit of the process objectives.



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- If you don't know what activities are needed to produce the output and in what sequence they need to be performed, you have not determined the process.
- The methods that ensure effective operation are those regular and systematic actions that deliver the required results.

# Leadership and commitment

- If the top management are of a mind to put profits first when making decisions, they have a learning opportunity that needs to be addressed.
- For top management to account for the effectiveness of the QMS they need to be able to explain its performance.
- Organizations that have no policy regarding quality are allowing mediocre performance, mistakes, inefficiencies and low standards to prevail.
- Any organization can become the best, but only with the full co-operation and participation of each and every individual contributor.
- Improvement in the QMS is necessary because it is an open system and therefore subject to external influences.
- To be a manager means sharing in the responsibility for the performance of the enterprise, which includes taking accountability for the QMS.





## Customer focus

- Organizations cannot maximize both customer value and shareholder value. They must pick one main objective and treat the others as constraints.
- Top management want its direct reports to succeed, and they want their office staff to succeed, and they want their front-line staff to succeed who want their customers to succeed.



# Policy

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- The primary instrument for aligning the organization towards satisfying customer needs and expectations is the quality policy.
- Policies are enacted where there are choices to be made; therefore the quality policy exists to guide personnel in taking actions that are consistent with the organization's commitment to customers and its strategic direction.
- Communication of policy is about gaining understanding and not just the sending of messages from one source to another.
- Front-line personnel may be empowered by making the customer the first priority, whereas personnel remote from customers may be empowered by making quality the first priority.
- The quality policy is applied before action is taken to produce a result consistent with the policy.



# Organizational roles, responsibilities and authorities



- Those assigned responsibility for ensuring the requirements of ISO 9001 are met, determine whether the organization conforms, and if not, they work with other personnel to bring policies and practices into conformity with the requirements.
- As each function strives to meet its objectives, it optimizes its own performance, which contributes to the sub-optimization of the organization as a whole.
- It is at the level where a process produces an output of value to the customer that there needs to be accountability for process performance, and this lies with a person who is answerable for its performance.
- Heightened awareness of customer requirements and the role people play in achieving them can inject a sense of pride in what they do and lead to better performance.
- Responsibility and authority for changing any element of the QMS and the way it is interconnected with other elements should be assigned to the person who plans and implements the change.



## Actions to address risks and opportunities

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- When we take action to address risks and opportunities, we are not reacting to circumstances that have already happened but trying to deal with circumstances that have yet to happen so that we are adequately prepared for the favorable or unfavorable consequences.
- If risks are not properly analysed they cannot be properly managed.
- When it comes to measuring risk, we need a form of calibration; otherwise, it's just guesswork that anyone can do.
- Converting a qualitative method of risk analysis into a points-based scoring method does not make it a quantitative method, neither does adding or multiplying scores that have been made on the basis of opinion.
- Whether a risk is to be avoided, eliminated, reduced, taken, shared or accepted depends on an organization's risk appetite, and this should be established before its goals are set as this will inevitably shape its strategy.
- If the methods used to evaluate the effectiveness of actions to mitigate risk do not actually measure the risks in a mathematically and scientifically sound manner, management doesn't even have the basis for determining whether a method works.



# Quality objectives and planning to achieve them

- **A quality objective is an objective that primarily benefits the customer by its achievement; therefore, for objectives to qualify as quality objectives they must serve customer satisfaction.**
- **There are two classes of quality objectives: those serving the control of quality (maintaining performance by mitigating risks) and those serving the improvement of quality (making beneficial change by exploiting opportunities).**
- **Objectives drive actions; therefore, unless the objectives are consistent with policies it is likely that work being undertaken in pursuit of objectives will not be aligned with the policies.**
- **It is not written statements of intent alone that will confirm the reality; evidence of actions taken is also necessary to reveal whether the objectives being pursued are actually consistent with the policy that is understood.**
- **Without a means of deciding whether an objective has been achieved, its achievement becomes a matter of opinion.**

22-10-2020



# Planning of changes

- The need for change may arise from of an evaluation of the effectiveness of the QMS, the result of management review or a reported opportunity for improvement.
- In ISO 9001 the word change refers to changes to purpose and objectives, to QMS performance, to specific projects, contract, products and services and to practices.
- All changes should have a reason, a purpose, a measure of success and will have consequences some of which may be undesirable.
- Managing the consequences is about maximizing the positives and minimizing the negatives. The positives won't materialize until the negatives are under control.
- Any change will affect what people do and the way they do it and may threaten their established habits, beliefs and status.
- The success of any change depends on how it is managed. Managed poorly, it creates more problems than it solves. Managed well, it accomplishes the vision of those who sponsored it.

# People

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- Unlike physical resources, people are adaptable and flexible; they can learn new skills and reach new levels of performance when the right competences are developed and when working in the right environment.
- As people are vital to enable organizations to achieve sustained success they should be perceived as capital and not resources, which implies that people are what we use to get what we want.
- The people needed will include those needed to model the QMS, those needed to determine and carry out the planned work represented in the model and those needed to carry out work which results from failure to do work right first time.
- When recruiting people, it's important that they will not only fit in the organization but also be a good fit to the job they are required to do.





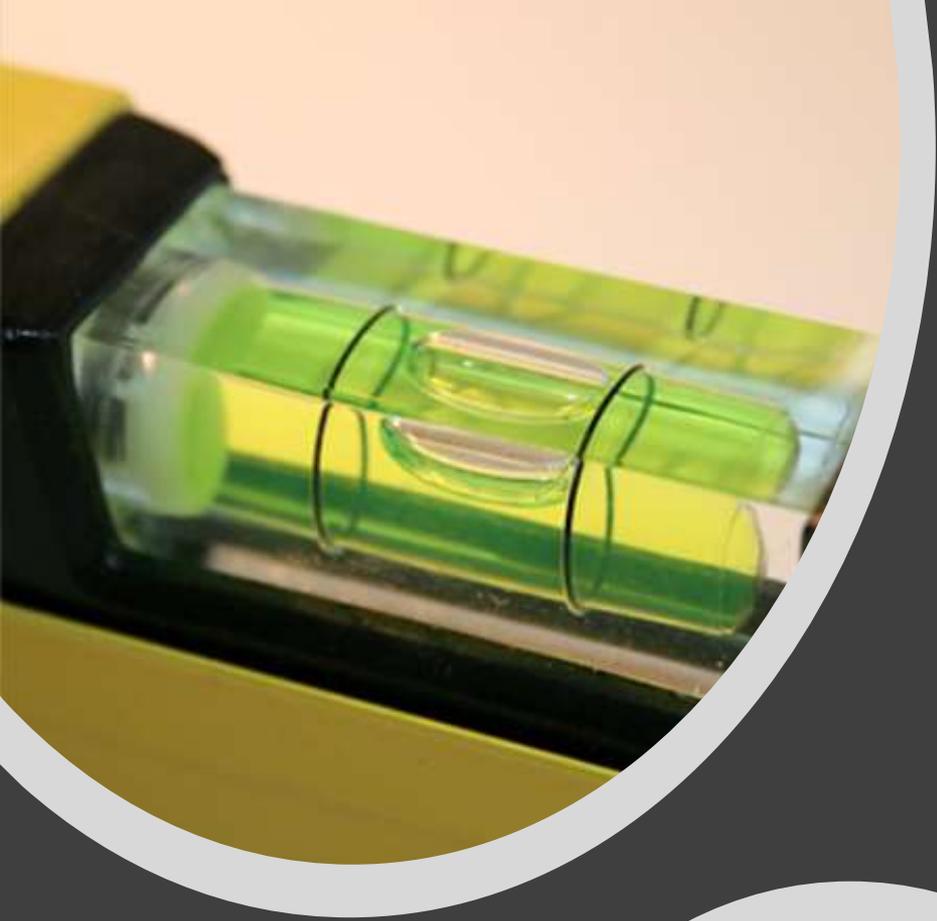
## Infrastructure

- The management of the infrastructure is a combination of asset management and facilities management.
- Account needs to be taken of the constraints the existing infrastructure may impose on processes for the design, development, production and delivery of products and services.

# Environment for the operation of processes

- Managing the processing environment is about identifying and addressing factors that will impede or improve process output quality and worker productivity.
- Workers who become unable to cope with their job because of its mental demands or the stress brought on by having to make difficult decisions are at risk of producing nonconforming product or delivering a poor service.





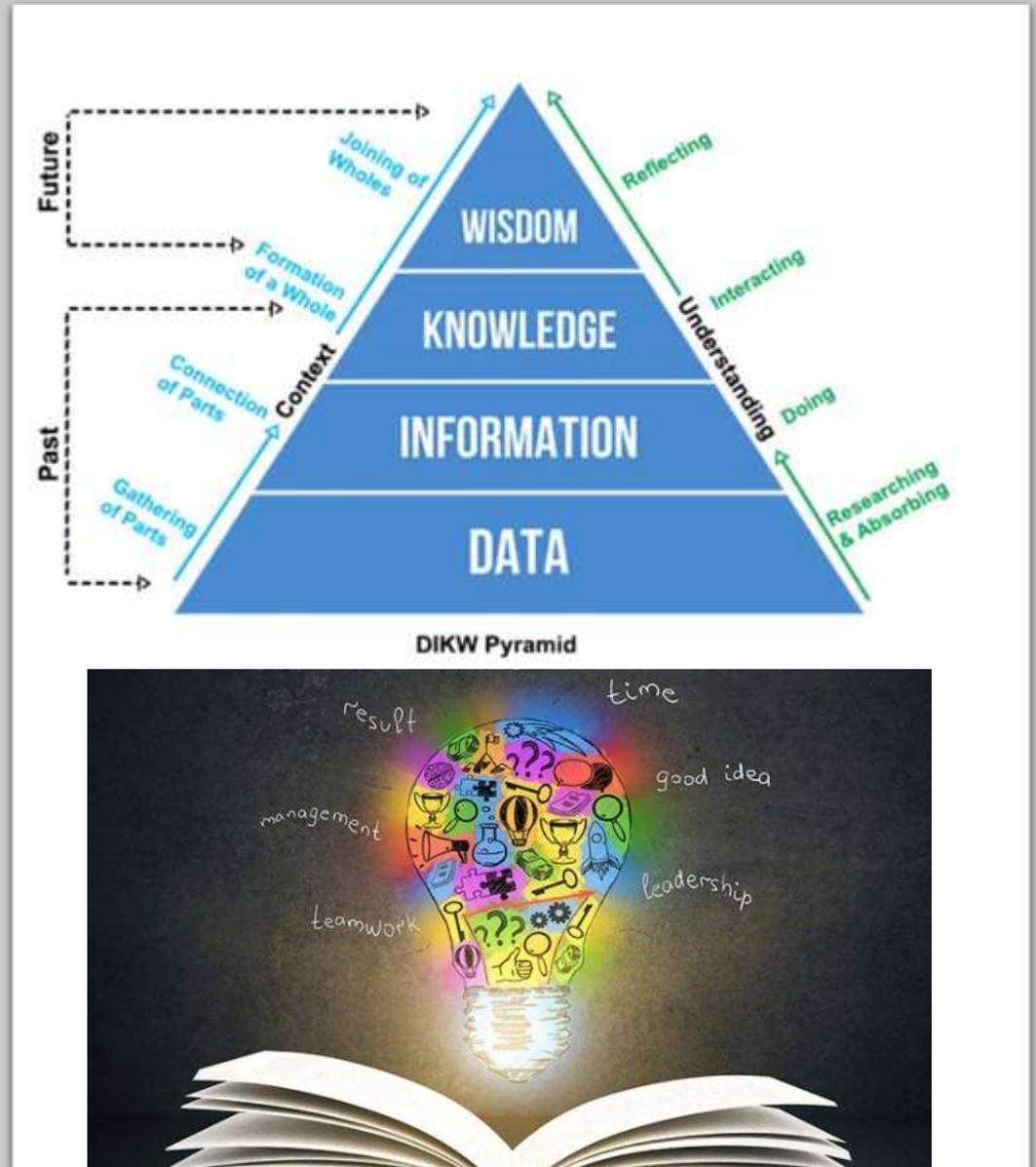
# Monitoring and measuring resources

- You know nothing about an object until you can measure it, but you must measure it accurately and precisely for the decisions to be soundly based.
- It is only possible to supply parts with identical characteristics if the measurement processes as well as the production processes are under statistical control.
- It is only possible to supply parts with identical characteristics if the measurement processes as well as the production processes are under statistical control.



## Organizational knowledge

- Organizational knowledge is all the knowledge resources within an organization that can be realistically tapped by that organization.
- Much of an organization's valuable knowledge walks out of the door at the end of the day.
- Organizations have a knowledge pool which is filled and drained when people join or leave and when media is created, archived and destroyed.
- An organization's capability is built on its acquisition and application of knowledge and therefore management need to be vigilant to threats which exploit its vulnerability.





## Competence

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- Competence is not a probability of success in the execution of one's job but a real and demonstrated capability to achieve intended results.
- Although a qualified person may have the requisite knowledge and skill and can present their certificates, they may exhibit inappropriate behaviours and be therefore not competent for certain roles.
- Competence is particularly important in the professions because the outputs result from an intellectual process rather than an industrial process.
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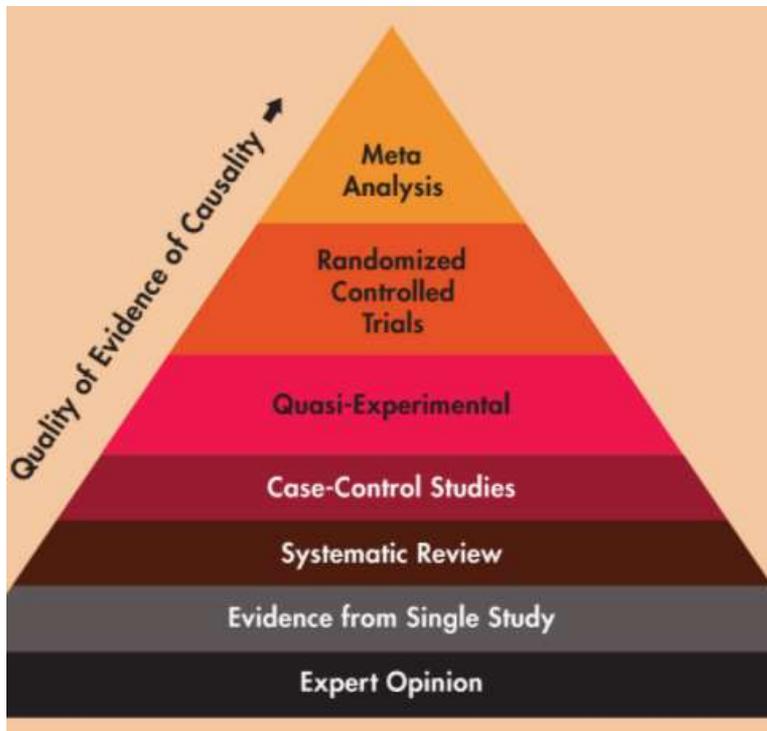
## Awareness

- Awareness of policy and objectives means that individuals are more able to select the right activities to perform in a given context.
- Awareness creates pride and a correct sense of importance. It serves to focus everyone on the organization's objectives.
- People who are unaware of the consequences of their actions are not competent. People who are aware of the consequences of their actions and ignore them are reckless.



# Communication

- In determining how information is to be transmitted, consideration needs to be given to the audience and their location along with the urgency, sensitivity, impact and permanency of the message.



## Documented information

- To claim conformity with ISO 9001:2015, the organization must be able to provide objective evidence of the effectiveness of its processes and its quality management system which is why the standard still stipulates requirements for certain documented information.
- Organizations will need to generate far more information that is required by ISO 9001 to provide conforming products and services but only that which needs to be documented and controlled for the QMS to be effective needs to be documented.
- The organization cannot control the revision, approval or identification of external documents but it can ensure such documents are appropriately identified before being made available and it can control their use.



## Operational planning and control

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- The processes needed to meet the requirements for the provision of products and services are those needed to specify, develop, produce and supply the products or services required.
- The process design requirements should address the risks and opportunities identified from the analysis of internal and external issues that affect the QMS.
- When planning these processes, the risks arising from inherent design weaknesses need to be identified and addressed so that the required output quality is assured.
- It's necessary to express criteria for the acceptance of products, services and processes in terms that their achievement can be verified with objective evidence.

## Customer communication

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- The quality of communication with customers is directly proportional to organizational success.
- Information provided in any form by an organization about its products and services needs to create expectations that can be satisfied without recourse to extraordinary action.
- Anything that may disrupt the provision of products and services following an agreement to supply will be a matter of great concern to customers and therefore of interest to them



## Requirements for products and services

- Where requirements for products and services are not properly established and understood by both customer and supplier before work commences, situations are more likely to arise downstream that invariably incur delays and additional costs.
- With every product one provides a service, and the quality of this service needs just as much care and attention as the quality of the product.
- Organizations have an obligation to comply with legal requirements whether or not they are invoked by their customers.
- Where the requirements of customers differ from those of other stakeholders, the customer requirements must take precedence unless a waiver can be negotiated or the opportunity to supply can be declined.
- Customer-focused organizations neither make claims about their products and services they cannot meet in full, nor do they deceive their customers by claiming their products and services provide benefits that are unreal.



## Design and development

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- Design is not a repeatable process because once a design has been completed the process ceases to exist and a new process is established for each new or modified product or service.
- Change control during the design process controls not only the design but also costs and timescales because once the design process has commenced every change will cost time and effort to address.

## Externally provided processes, products and services

- Externally sourced processes, products and services can have varying degrees of impact on the processes of the organization and its products and services, and therefore, the controls applied need to be proportionate to the level of risk.
- The effort spent on developing external providers should be proportional to the consequence of their failure on meeting the organizations objectives.



# Production and service provision

- The production and service delivery process is a journey along a proven path with what is expected to be a predictable outcome.
- Process control comes about by operators knowing what results to achieve, by knowing what causes results to vary and by being able to correct performance when necessary.
- If effort is concentrated on the process using the results of output verification and the root cause of variation is eliminated, rework will gradually reduce until all outputs are of consistent quality.
- There is a perception that human errors are preventable, but despite mistaking proofing by design, everyone can make errors no matter how well trained and motivated they are.
- Determination of preservation requirements commences during the design phase or the manufacturing or service planning phase by assessing the risks to product or service quality during its production or delivery.

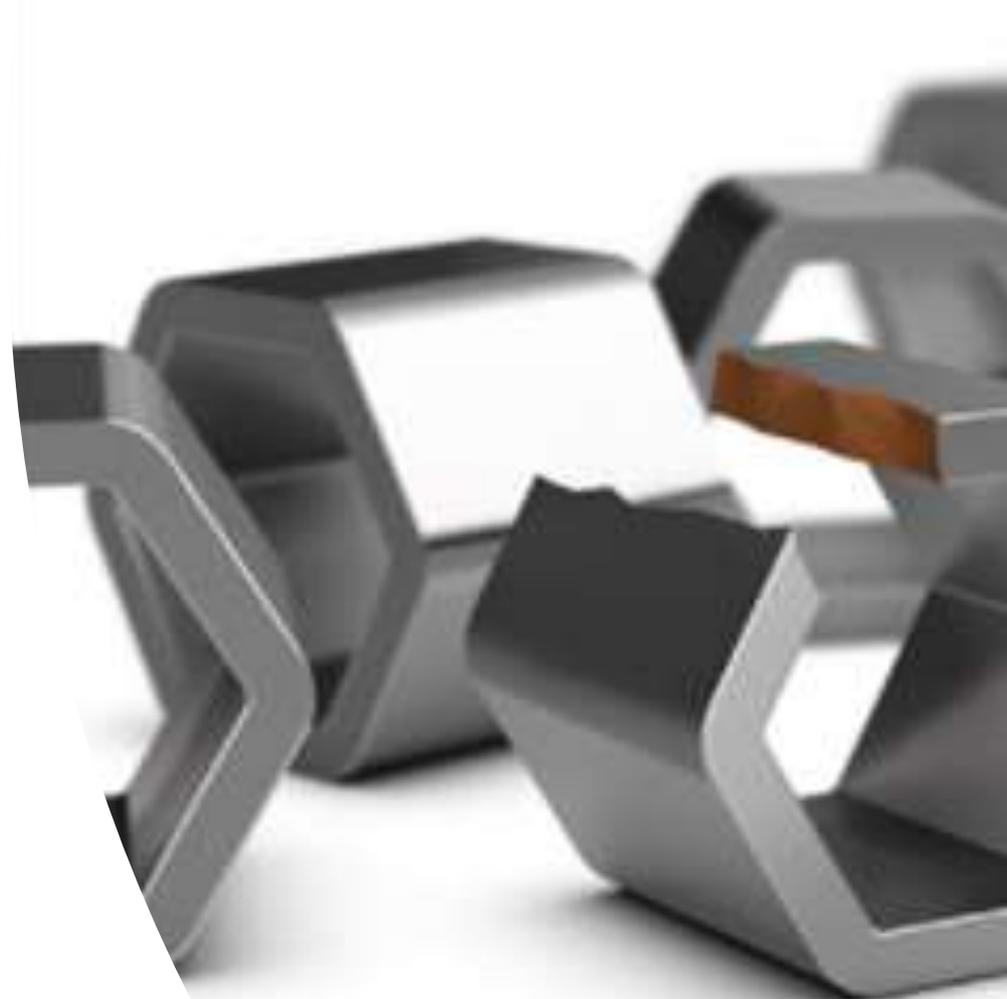
## Release, delivery and post-delivery of products and services

- If one could be certain that a product or a service would be correct without it being verified, verification during or after its generation would be unnecessary.
- It would be considered prudent to prohibit the premature release of product if you did not have an adequate traceability system in place
- Unless otherwise deemed unnecessary, verification needs to occur after a specified feature has been produced and before it becomes inaccessible for measurement.
- Mistakes made at the packing stage may be the last mistakes made but they will be the first the customer sees.

# Control of nonconforming outputs

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- Nonconformities are caused by factors that should not be present in a process.
- The factors that cause nonconformity on one occasion will (unless removed) cause nonconformity again and again.
- In service delivery processes, there is often no intermediate step between producing an output and delivering it to a customer, so the process has to be deemed capable before going live.
- The only cases where you need to request concessions from your customer are when you have deviated from one of the customer requirements, cannot make the product or service conform but can demonstrate it's fit for its intended use.





# Monitoring, measurement, analysis and evaluation

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- You know nothing about an object until you can measure it, but you must measure it accurately and precisely.
- To have confidence that the intended results are being achieved, before we measure, we need standards, targets and requirements we can use to judge the results of measurement.
- Measurement begins with a definition of the measure, the quantity that is to be measured, and it always involves a comparison of the measure with some known quantity of the same kind.
- Quality is an intangible until we specify what we mean by quality and express it in terms of characteristics we can measure.
- There should be no measurement without recording, no recording without analysis, no analysis without evaluation and no evaluation with action even if it is to keep going.
- Pick the wrong time for measuring or monitoring a quantity and the data produced may be unreliable, invalid and useless for further analysis and evaluation.

## Customer satisfaction

- Data on customer perceptions will serve to validate not only the business outputs but also the assumptions made about customer requirements.
- The most important part of a customer survey is to ask the right questions, and these need to be derived from what customers expect from your products not what you want from them.
- There is no standard customer, so we need to look at the demographics of a given population to find the variables and determine their relevance.
- The integrity of the process for determining the degree of customer satisfaction is paramount; otherwise, you could be fooling yourselves into believing all is well when it is far from reality.



## SIX THINKING HATS



Facts - just collecting facts



Brightness & optimism -  
positiveness, value & benefits



Caution & criticalness -  
reasons of why something  
may not work  
*Do not overuse!*



Possibilities & creativities -  
new ideas, concepts  
& perceptions



Reviewing your thinking process -  
making sure all hats  
have been used



Feelings, hunches & intuition -  
allowing your feelings come in e.g.  
happy, terrible, impossible...

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# Analysis and evaluation

- Analysis is a thinking process – it's objective, whereas evaluation is judgmental and reaches a conclusion after assessing the results of the analysis.
- Conformity is judged by the extent to which a specification is met and normally determined by the producer whereas, quality is judged by the extent to which needs, and expectations are met and determined by the customer or their representative.
- When analysing service conformity, variables that cannot be measured directly need to be translated into variables that can be measured directly but it won't be sufficient to limit the translation to a single variable.
- If we can demonstrate that the process is stabilized about a constant location, with a constant variance and a known stable shape, then we have a process that is both predictable and controllable.
- The cause of variations in the location, spread and shape of a distribution is considered special or assignable because the cause can be assigned to a specific or special condition that does not apply to other events.

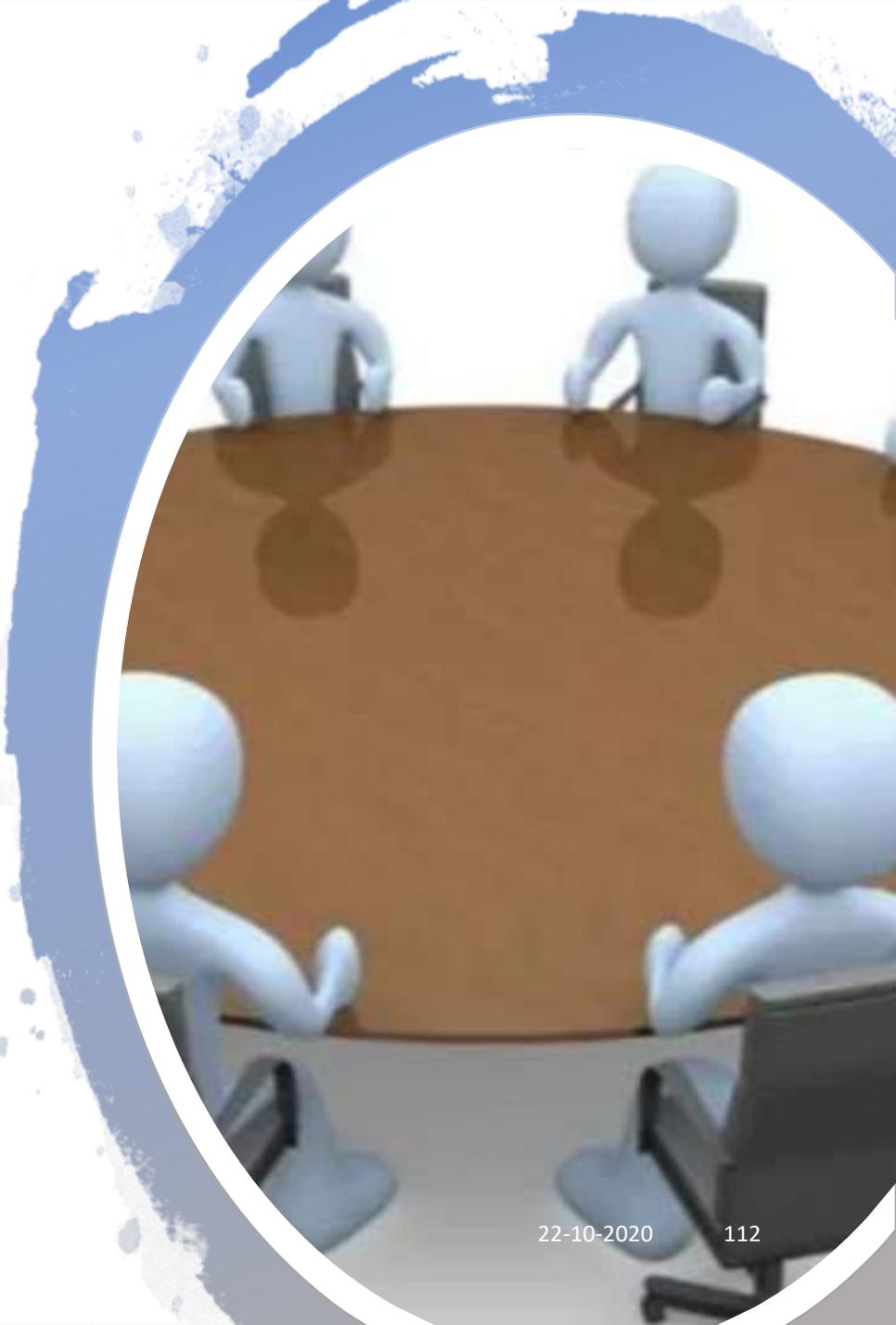


## Internal audit

- Both customers and managers have a need for an assurance of quality as they are not able to oversee operations for themselves – this is the role of the internal audit.
- If we begin with the end in mind, we will start an audit by wanting to know if the system was achieving its intended results, and only afterwards establish if it conformed to ISO 9001.
- Auditing is a skill, and proficiency in auditing is more effectively demonstrated when the auditor is observed asking questions of people at their place of work, assessing the answers and evidence presented, drawing conclusions and presenting evidence substantiating their findings.

## Management review

- When presented with evidence of whether the QMS they established is doing the job they wanted it to do, will it do the job it needs to do in the future and, if not, what needs to change, top management will be better informed to make decisions and set priorities for action relative to product and service quality.
- Top management will not regard the management review as important unless they believe it is essential for running the business.
- The QMS is the means for setting and achieving quality objectives; therefore, it makes sense to review the means when reviewing the ends so that actions are linked to results and commitment secured for all related changes in one transaction.
- Improving the effectiveness of the management system is not about tinkering with documentation but enhancing the capability of the system so that the organization fulfils its objectives more effectively.



# Determining and selecting opportunities for improvement

- We cannot improve anything unless we know its present condition, and this requires measurement and analysis to tell us whether improvement is both desirable and feasible.
- We can undertake activities with the object of improving a situation but unless and until the situation improves there is no improvement.
- Every improvement must improve the performance of the system as a whole; otherwise, it's wasted effort.
- Customers probably won't complain if the errors are imperceptible but increase over time – eventually they take their business elsewhere without giving notice.

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# Nonconformity and corrective action

- Beware of ascribing a variation to a special cause when it belongs to the system and ascribing a variation to the system when the cause was special.
- Simply asking why an event occurred might reveal a cause, but don't accept the first reason given because there is usually a reason why this previous event occurred.
- When nonconformities occur it's important to know whether their frequency and consequences had been predicted during system, process, product and service planning and for risk assessments to be validated or revised accordingly.
- It is only after a reasonable time has elapsed without a recurrence of a specific nonconformity that you can be sure that the corrective action has been effective.

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- When organizations cease changing, they become fossils. Even maintaining the status quo requires organizations to change because all around them is changing.
- It's the recurring nature of improvement within the organization regardless of what is being improved or the magnitude of improvement that qualifies improvement as being continual improvement.
- When discontinuous changes occur such as a breakthrough in technology, an economic crisis, a natural disaster or a change in leadership, improvements that have been accumulated over months or years, may be swept away in an instant.
- Improvement in products and services is not an improvement in the QMS, because if by executing a process of the QMS, products or services are improved, the QMS is doing what it was designed to do.
- Improvement in the suitability, adequacy and effectiveness of the QMS requires appropriate units of measure and measurement to be undertaken before and after changes are made to the QMS as evidence improvement has occurred and is recurring periodically.



# Questions and Answers



**Ian Venter**



# Trenchless Technology



Alaster Goyns



22-10-2020

# TRENCHLESS TECHNOLOGY

## THE NEED FOR SA STANDARDS



### SAPPMA QUALITY WORKSHOP V

### KEY MESSAGES

*Alaster Goyns on behalf of SASTT 22 October 2020*

# URBANISATION MEANS

More and more people needing  
more and more services

What services are needed ?

Where do services go ?

How are services installed ?

**HOW LONG DO SERVICES LAST ?**

1  
1  
9

# SERVICES ESPECIALLY WATER PIPELINES GET OLD



But just as with people they  
can be rehabilitated and  
carry on providing the  
required service

# WHAT HAPPENS TO AGING WATER PIPELINES ?

They may

- Crack
- Deform
- Corrode

They then:

- Become silted
- Loose capacity
- Lose bedding support
- Become structurally unsound
- Eventually they collapse

# HOW ARE AGING SERVICES FIXED ?



*We can't just dig up our streets*

*Just causes additional problems*

*There are much better ways*



*Ways that have been around  
for a long time*

## TRENCHLESS WAYS

# EXISTING PIPELINE BIG ENOUGH

*Linings effective for renovating pipelines so that secondary requirements of water tightness, strength and durability are met.*

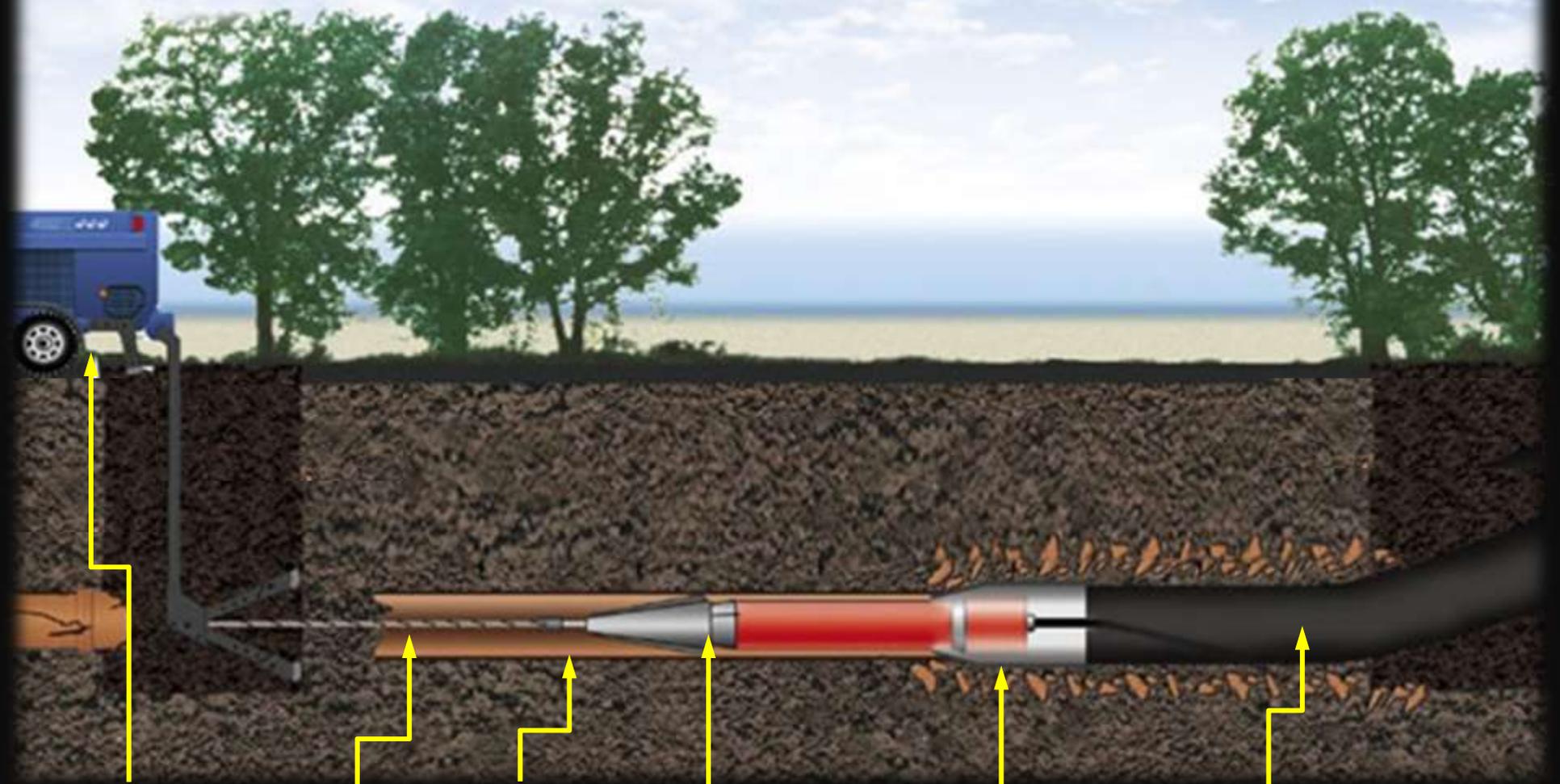
*But not always effective in ensuring that pipelines meet primary function of conveying sufficient water.*

# SERIOUS UNDER CAPACITY ISSUES

*The existing pipelines just do not have the capacity to deal with densification of 5, 10 or more people in a given area.*

*We can share transport or use public transport; but does anyone want to do so with toilets, taps and other services?*

# ON LINE REPLACEMENT- PIPE BURSTING



**Winch**   **Cable**   **Old pipe**   **Guide head**   **Expander**   **New pipe**

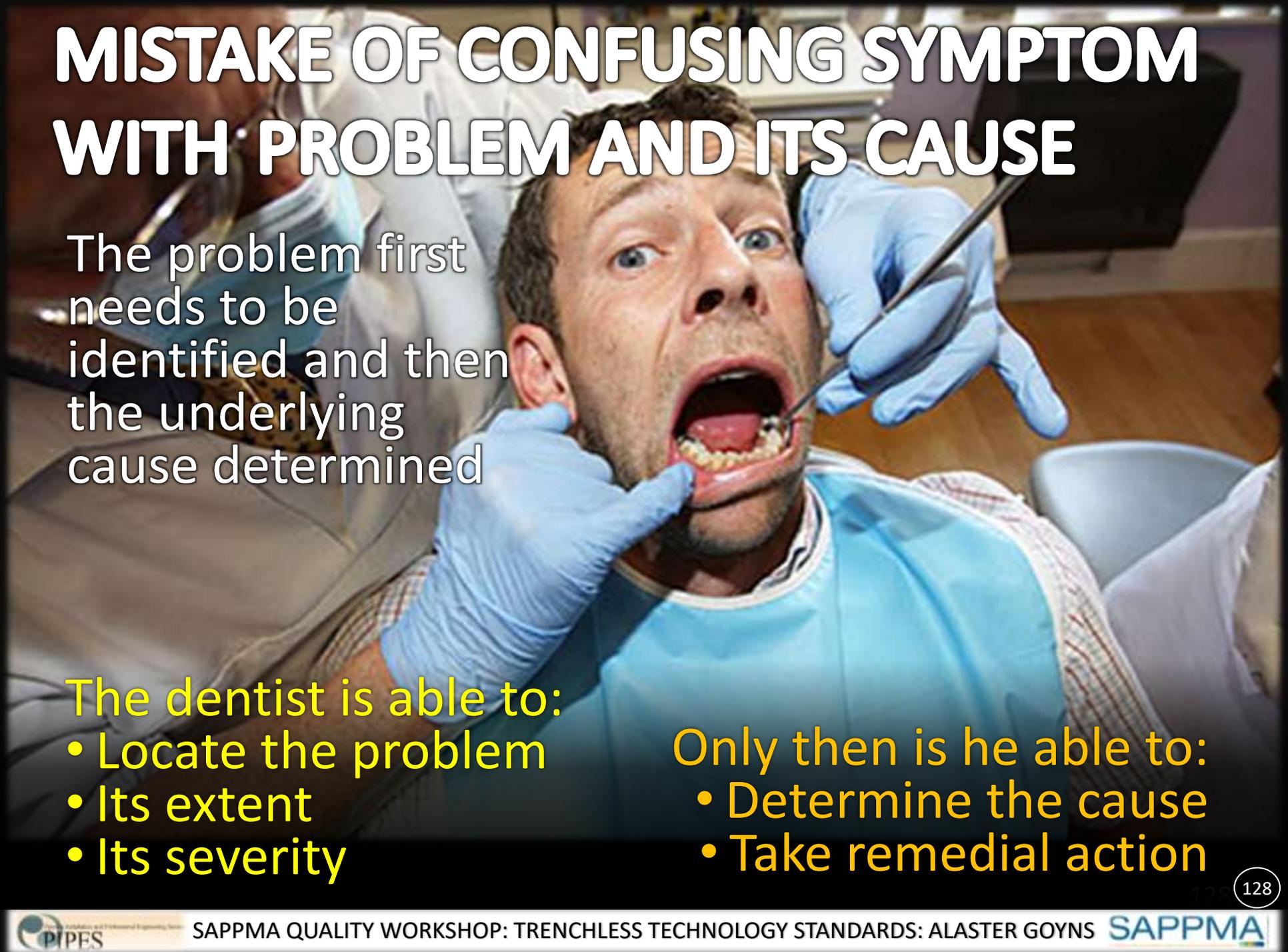
# IS THIS ACTUALLY THE PROBLEM?

So what caused the overflow ?

- Inadequate capacity
- A blockage
- Root intrusion
- Corrosion
- Relative settlement
- Construction damage

**DIRTY WATER NOT STAYING IN DIRTY WATER PIPES  
IS JUST THE SYMPTOM – NOT THE PROBLEM**

# MISTAKE OF CONFUSING SYMPTOM WITH PROBLEM AND ITS CAUSE

A photograph of a man in a dental chair, looking surprised or concerned as a dentist in blue gloves examines his teeth with a dental instrument. The man is wearing a blue dental bib. The background shows a typical dental office setting.

The problem first needs to be identified and then the underlying cause determined

The dentist is able to:

- Locate the problem
- Its extent
- Its severity

Only then is he able to:

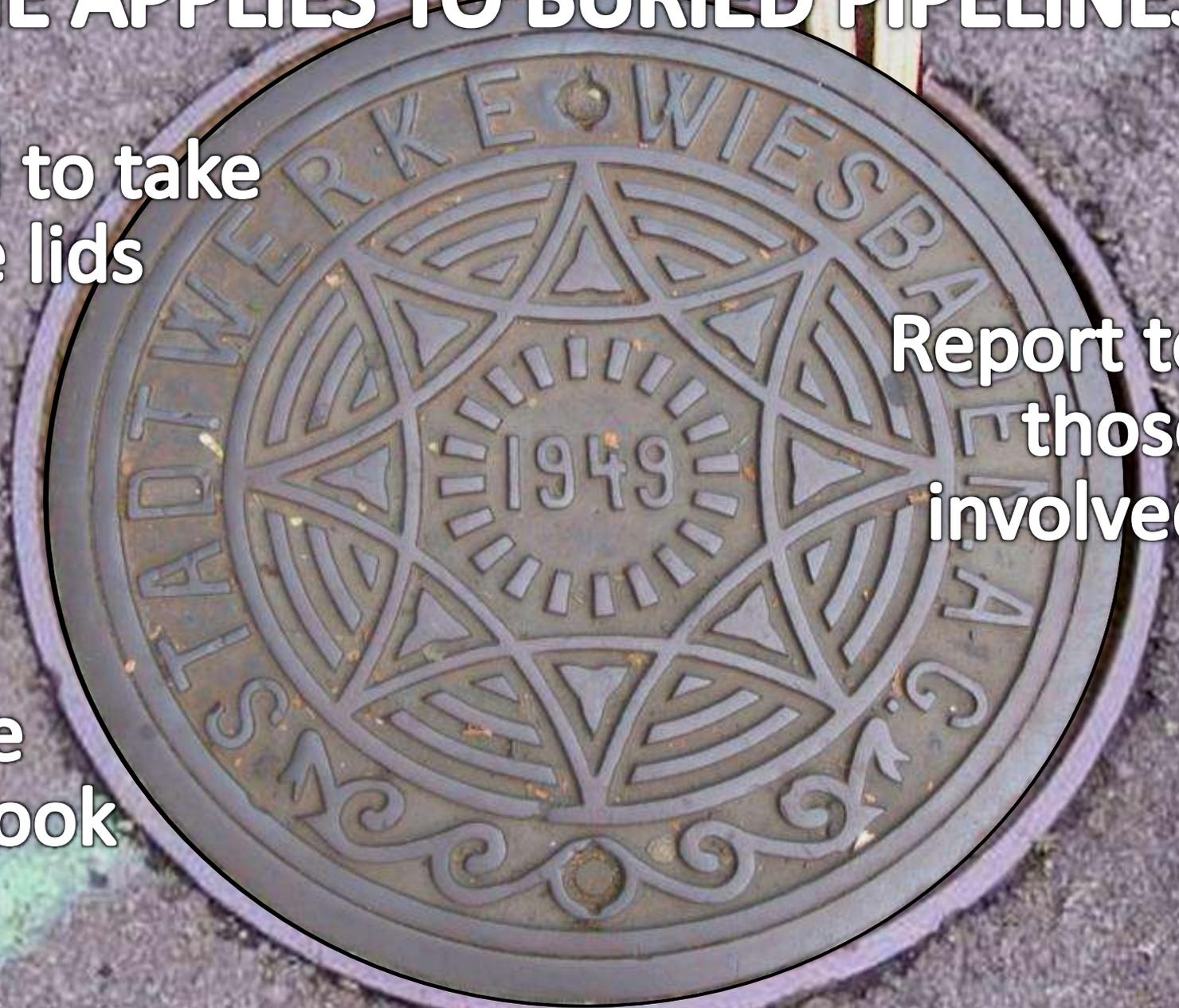
- Determine the cause
- Take remedial action

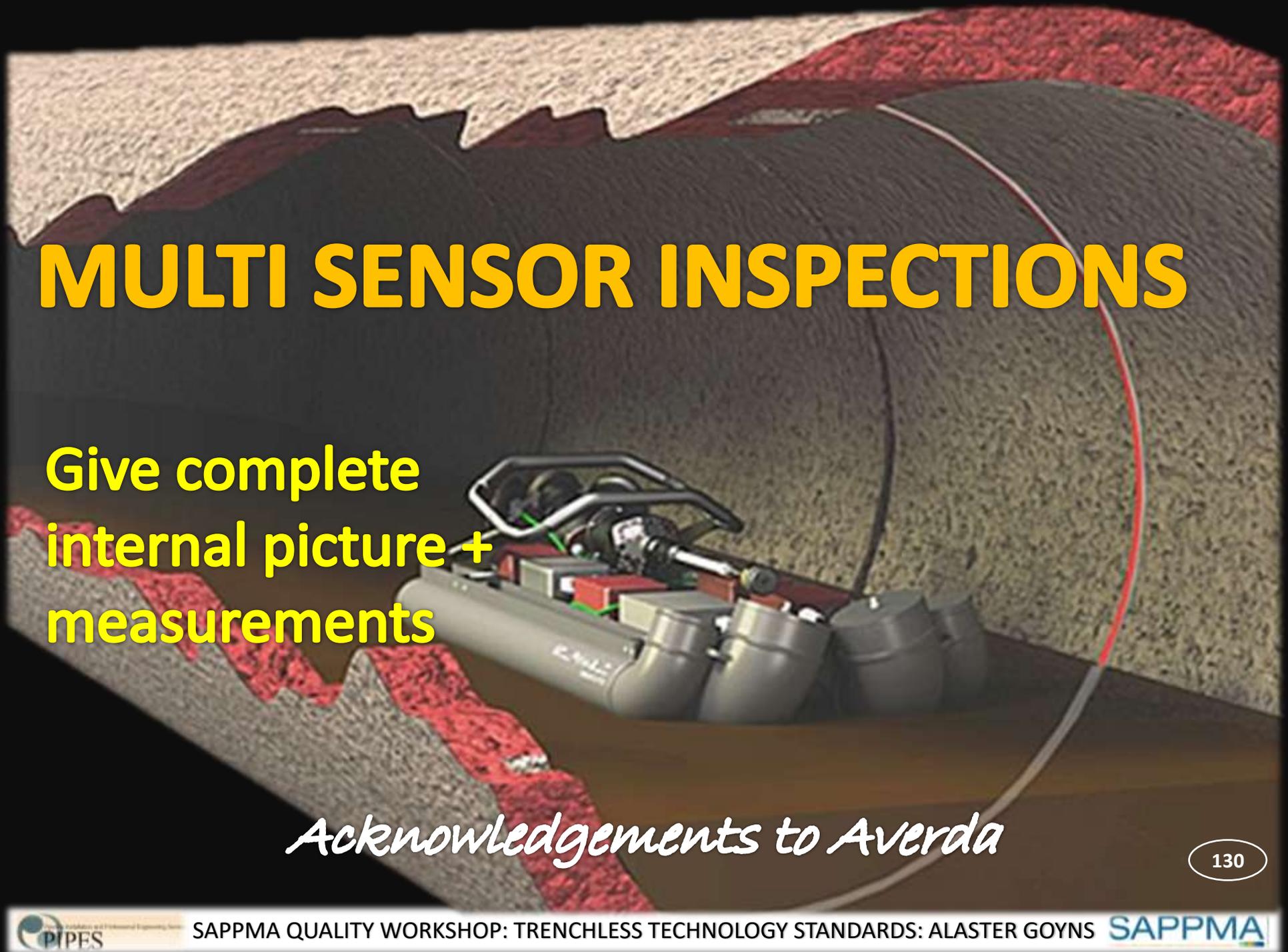
# SAME APPLIES TO BURIED PIPELINES

Need to take  
some lids  
off

Report to  
those  
involved

Get  
Inside  
and look





# MULTI SENSOR INSPECTIONS

Give complete  
internal picture +  
measurements

*Acknowledgements to Averda*

Rehabilitation before  
assessing condition

Just

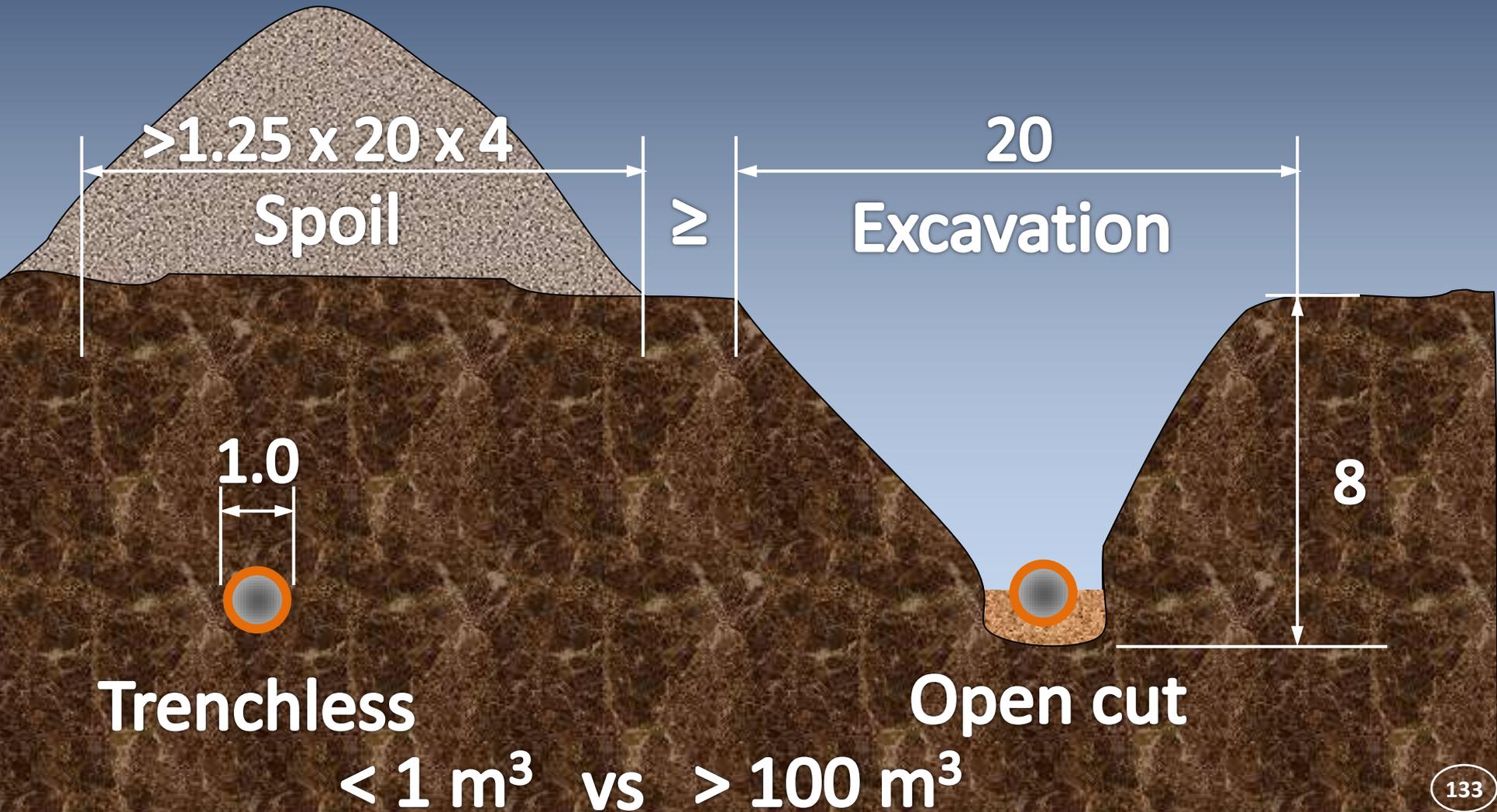
Throwing money  
down the toilet

# WHAT IF NO SERVICES AT ALL OR SERVICES INADEQUATE?

*But how to  
do this in  
the informal  
un-serviced  
areas?*

Digging trenches  
down the streets  
in established  
areas may be  
possible

# THE TRENCHLESS ALTERNATIVE



# HORIZONTAL DIRECTIONAL DRILLING (HDD)

Drilling rig

Control panel

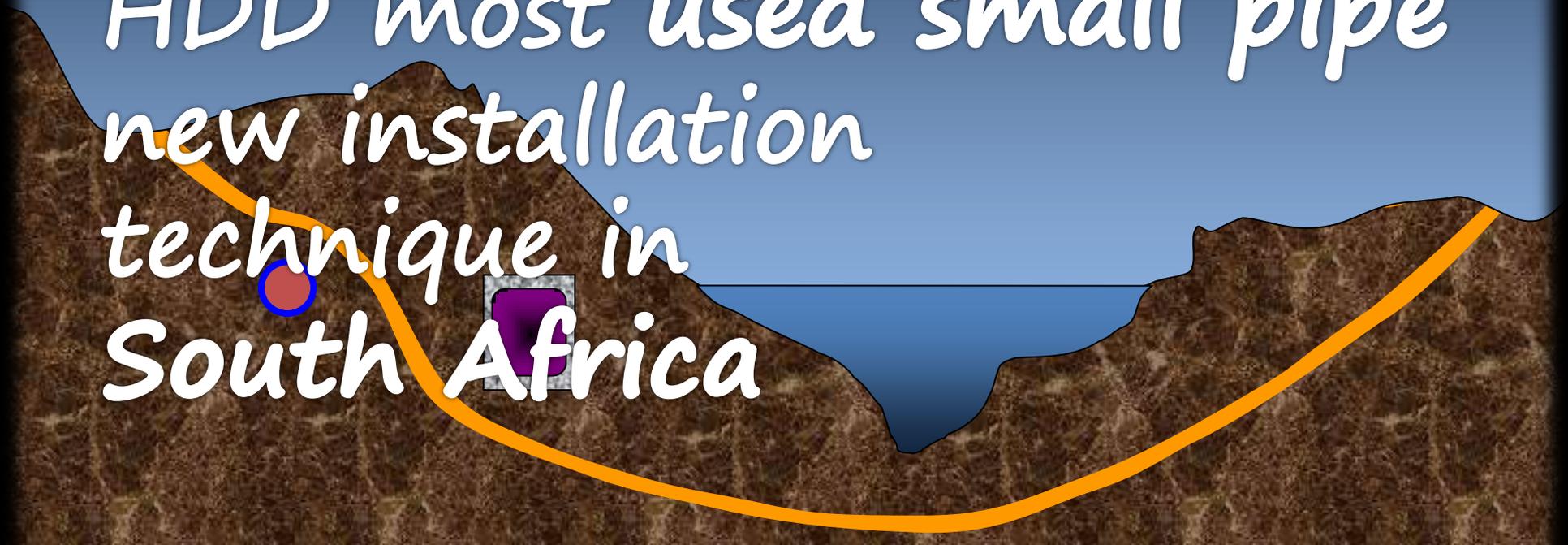
Drill rods

Fluid assisted

**Drill head gives direction**

# NEW PRESSURE INSTALLATIONS

*HDD most used small pipe  
new installation  
technique in  
South Africa*



**Soil removal**

**Long lengths possible**

**Steerable**

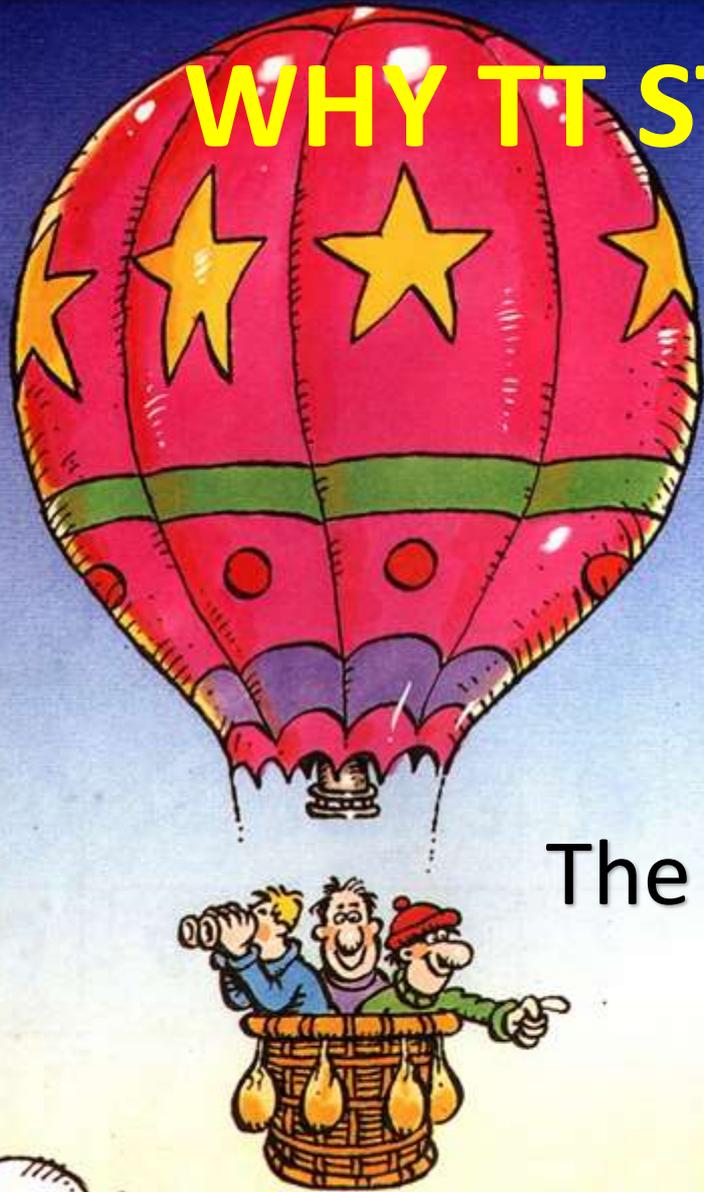
**through soils & rock**

# MICRO TUNNELLING



Little done in South Africa, but great future potential  
Advantage for gravity lines - gradient control very good

# WHY TT STANDARDS NEEDED



Communication between  
role players

Evaluate quality

Ensure consistency

Know what to specify

The need to provide for future



# WHY ARE SA STANDARDS NEEDED?

*Acknowledgements to* MARK WIGGETT ©

# ALTERNATIVE TO STANDARDS

The conservative approach

- Assume the worst-take
- Possibility of problem
- Costs more than ne

The liberal approach

- Assume the best-take
- Address problems if th
- Project cost minimized

RISK OF  
COWBOYS  
CLAIMING  
TO KNOW  
IT ALL

NEITHER COST EFFECTIVE OR REALISTIC



# IF NO STANDARDS USED

Could miss important factors  
Failure risks higher  
Problem solving  
more difficult  
Probably overall  
costs greater

**SASTT WANTS TO KEEP YOU OUT OF TROUBLE**

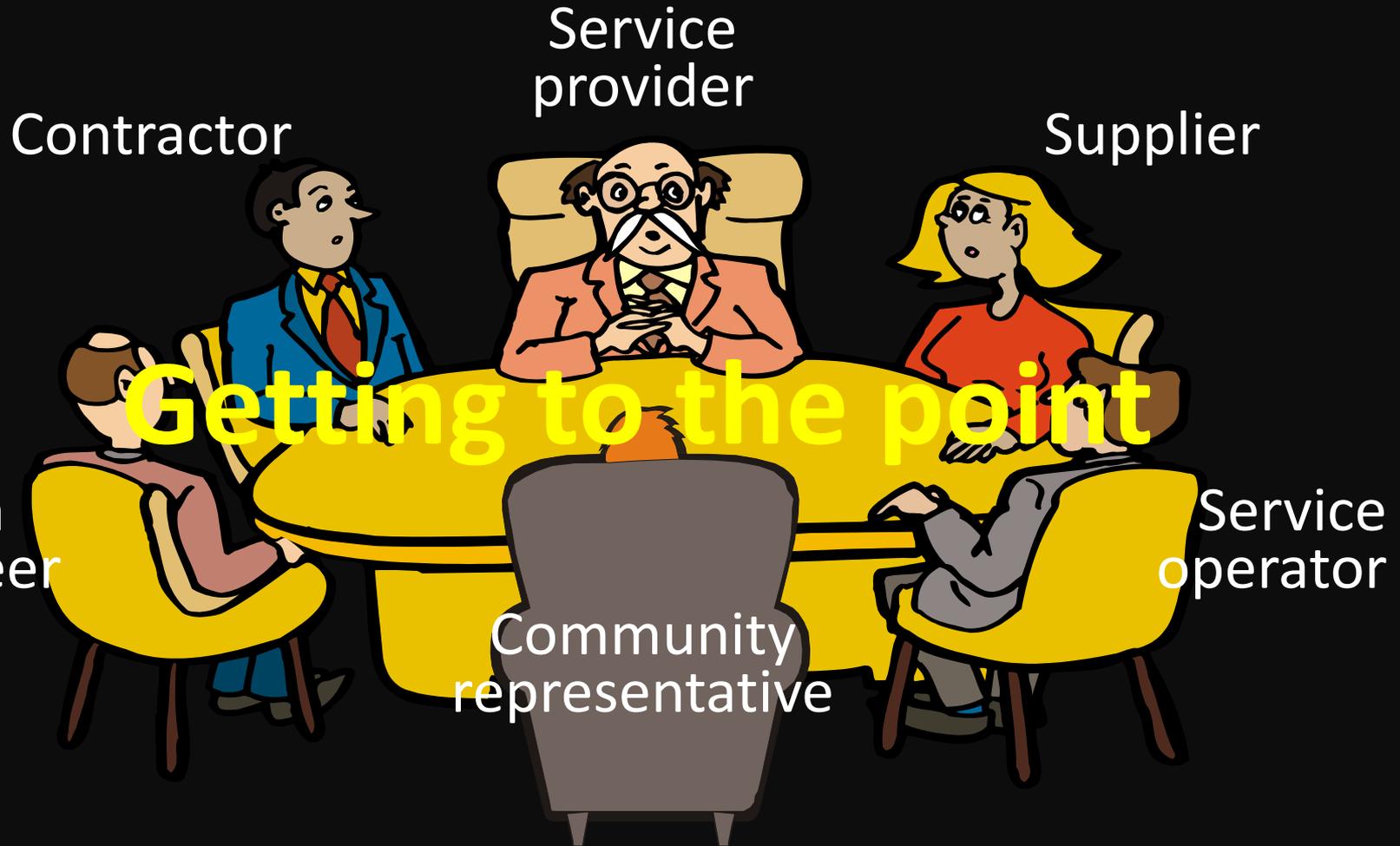
**Then you're in real trouble**

# PROBLEMS COME TO THE SURFACE AND COST MORE THAN MONEY

They cost public's  
inconvenience  
and authority's  
reputation

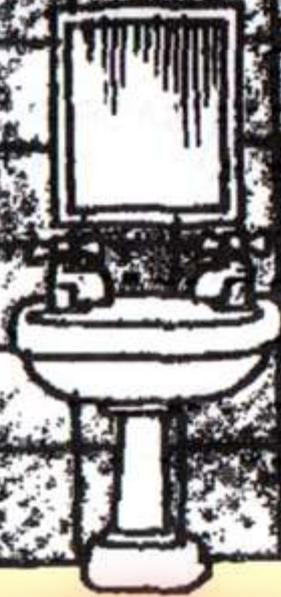
Buried problems  
don't stay buried

# ROLE PLAYERS SHOULD BE A TEAM



Effective teams must communicate effectively

# IMPORTANCE OF COMMUNICATION



*All parties must see eye to eye*

# THE SOUTH AFRICAN SITUATION

First generation water services aging

More than 65% of population urbanized

Water supply characterized by

- Too little – droughts
- Too much - floods
- Too dirty - pollution

Desperate need for water services

- Providing new services
- Rehabilitating old services

**QUALITY WATER SERVICES ARE ESSENTIAL  
TO PREVENT WASTAGE AND LOSSES**

# THE SERVICE DEMAND CHALLENGE



SERVICES SHOULD HAVE STANDARDS TO ENSURE  
QUALITY, REGULATION AND MAINTENANCE



*The densifying established areas*  
*The un-serviced informal areas*

# APPROPRIATE STANDARDS NEEDED FOR DEVELOPING NATIONS LIKE SA

Purpose of standards is the same everywhere:

- Doing the work correctly
- Uniform means of communication
- Means of comparison
- Evaluation of quality

But the need for these standards is greater when:

- Only contractor may understand the technology
- Much of technology is imported and adapted
- All parties need to understand the basics
- Shortage of skills
- Different education standards

## SA NEEDS THE INTERNATIONAL SUPPORT

# WHAT HAS BEEN DONE ?

## A FRAMEWORK FOR ESTABLISHING APPROPRIATE TRENCHLESS TECHNOLOGY GUIDELINES AND STANDARDS IN SOUTHERN AFRICA

A Mc N Goyns • FS Crofts

WRC Report No. KV 133/01

A study was done to establish what TT standards were needed in SA

Funded by WRC

Motivated & endorsed by SASTT

JV between PIPES cc & Technikon Pretoria

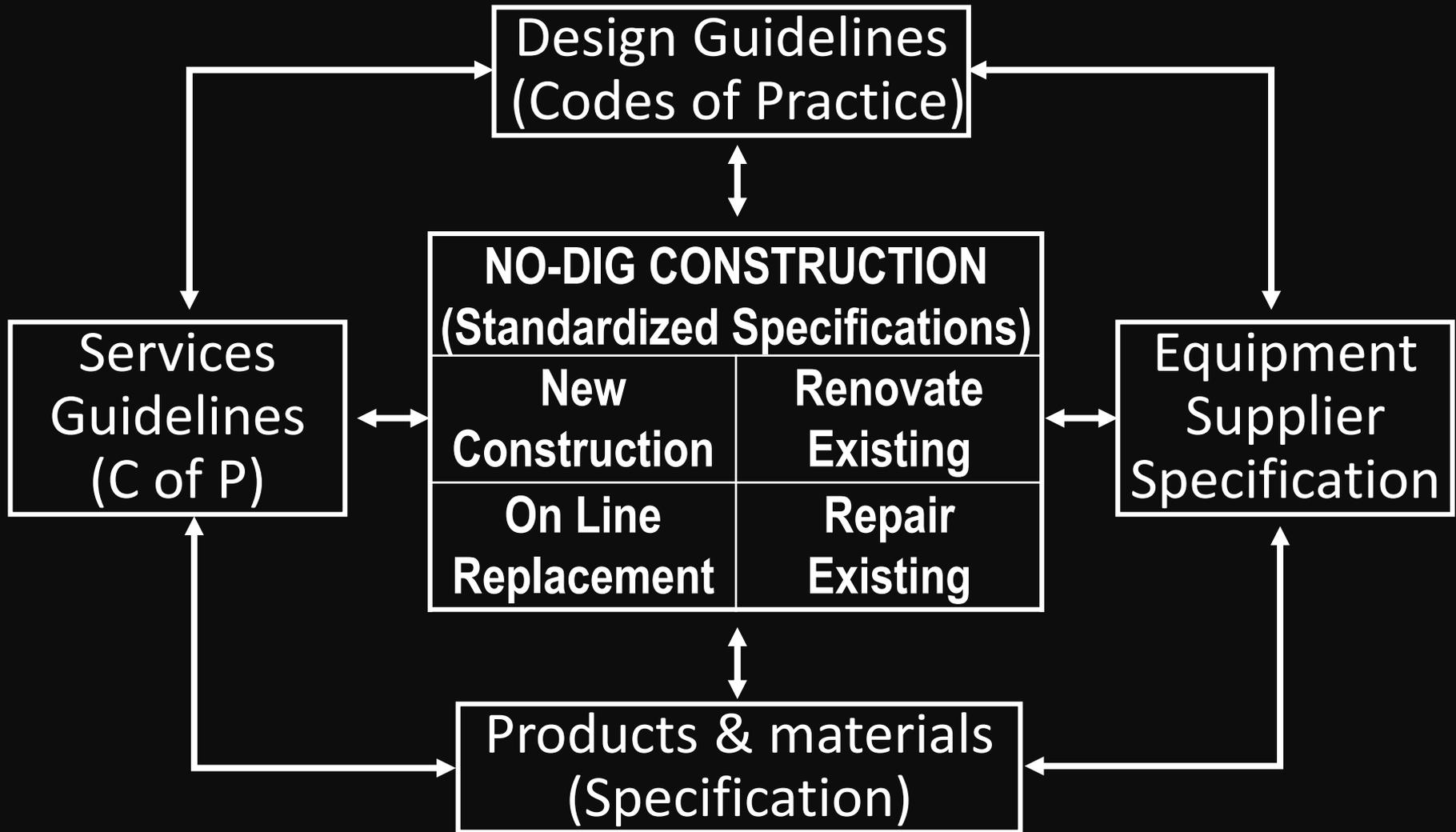
Document available from WRC



Water Research Commission

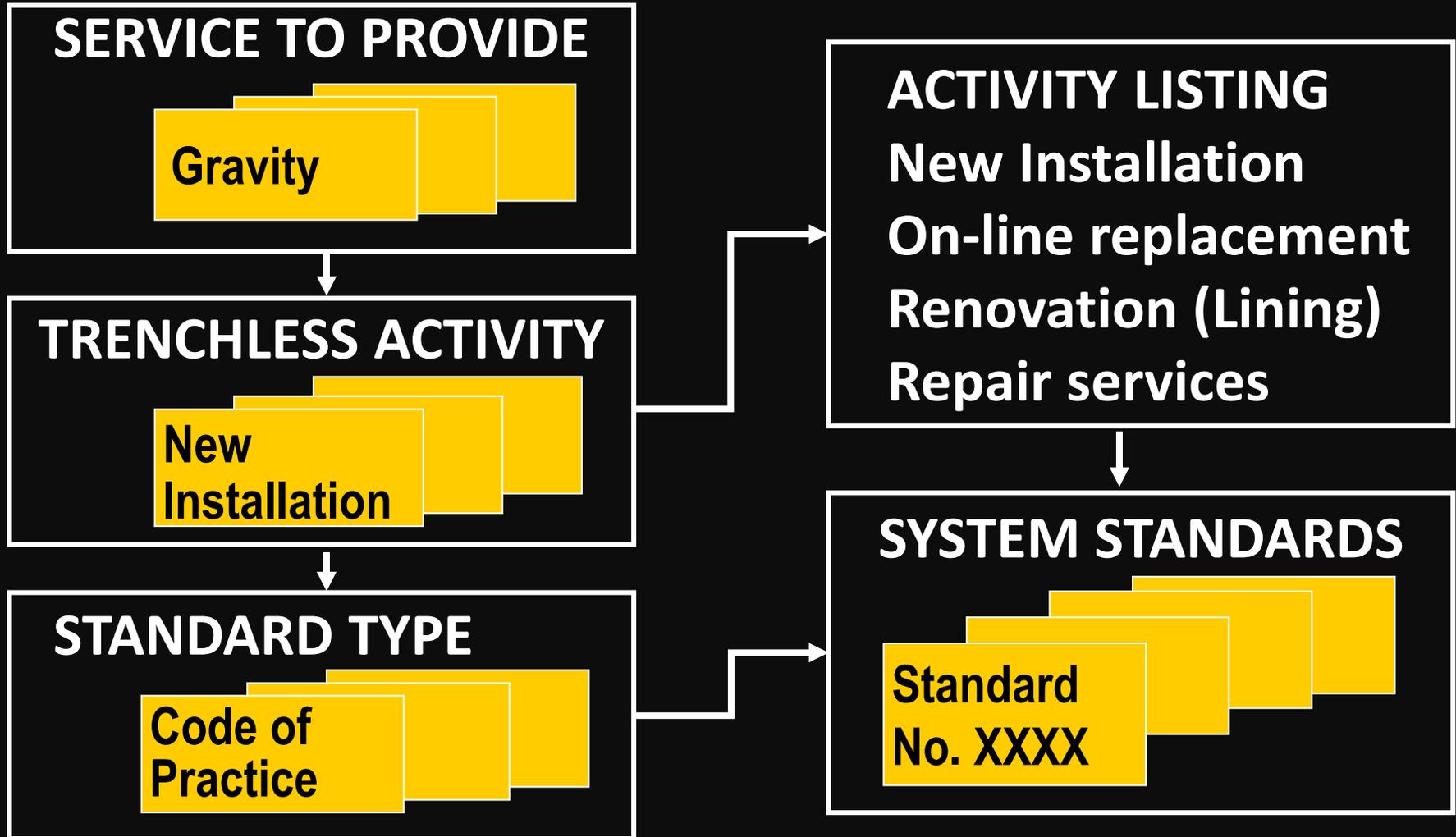


# INTERACTION OF TT ACTIVITIES



Standards for particular technique should be linked

# FRAMEWORK FOR TT STANDARDS



**STANDARD NEEDS TO MEET STAKE HOLDER'S NEED**

# DESIGN STANDARD SHOULD COVER

- Impact on community & environment
- How utility owner's needs are to be met
- Whether utility if new can be rehabilitated
- Determination of useful life of existing service
- Cost effectiveness of alternatives
- A risk analysis

This must provide the details needed to write the Standardized Construction Specification

Standardized Construction Specification covers:

- The quantity of work
- Measurement & payment items
- How to meet specified design requirements

# PROPOSED CATEGORIES BY SASTT

To start must establish the need

If there already is a pipeline must first establish its health/condition

Can then determine what to do

Proposed broad categories are

- Condition assessment
- Rehabilitation
- On-line replacement
- New pipeline installation

# MUST MEET BASIC SERVICE NEEDS

They must be appropriate and cost-effective



For healthy living conditions, these services must:

- meet quality requirements
- have long, trouble-free life
- be rehabilitable

**AN IMPOSSIBLE DREAM WITHOUT APPROPRIATE STANDARDS, TECHNOLOGY & SKILLS NEEDED**

# REMEMBER THAT THE HOLES ... ARE THE ASSETS

*Address service backlog need by:*

- 1. Installing new pipelines*
- 2. Rehabilitating old pipelines*

*Adopt a realistic approach to  
effectively provide water services  
using the appropriate technology*

“It is **health**  
that is real **wealth**”

Mahatma Gandhi

Healthy water supply and disposal systems  
provide primary health care

And we as designers/providers  
can help South Africa achieve this

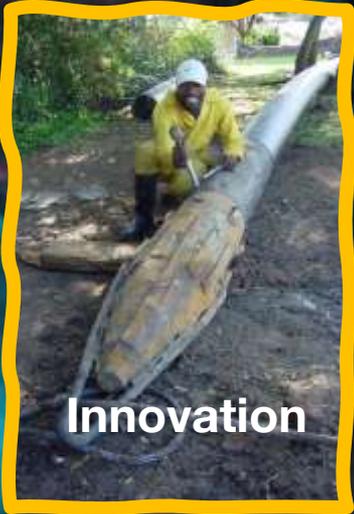
# Questions and Answers



Alaster Goyns



# Key Messages



Innovation



Processes



Systems



Formulation



Thank You

*Participants  
Audience  
& Organizers*



# Questions and Answers



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