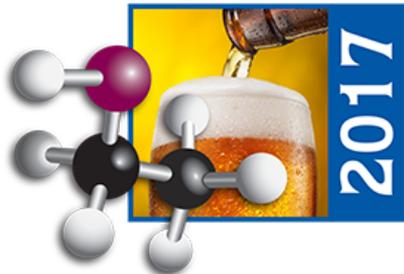


Training for a sensory QA program

Amaey J Mundkur & Dr Bill Simpson
Cara Technology, UK



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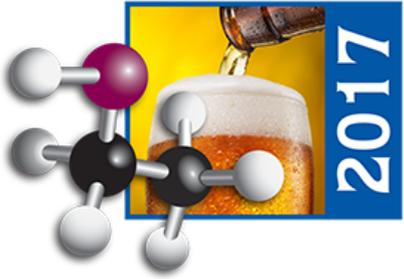
See what SCIENCE can brew for you



Overview

- ▲ **Who needs training?**
- ▲ **Taster training**
- ▲ **Training of taste panel leaders**
- ▲ **Taking action on results**
- ▲ **Summary and conclusions**





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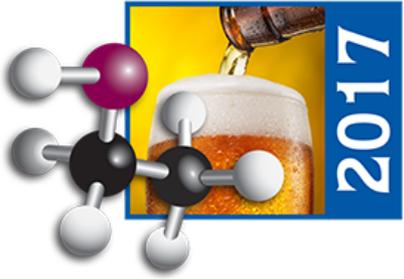
1. What's the point?

What's the point of professional beer tasting?

Aim is to provide results to brewers, packers and distributors which are:

- ▲ Understandable
- ▲ Valid
- ▲ Repeatable
- ▲ Actionable

Some sensory test methods do not meet these criteria, no matter how well they are executed



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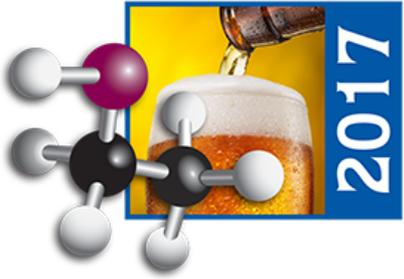
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2. Who needs training?

Who needs training?

To build a solid sensory QA program we need to train:

- ▲ Our tasters
- ▲ Our taste panel leadership
- ▲ Our brewers



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3. Taster training

Assessment methods

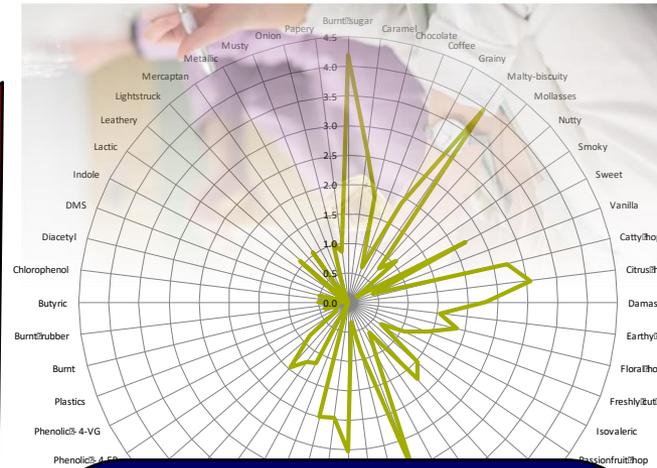
method

A = B?

Difference tests

A = OK?

Quality tests



Descriptive profiling

What to test

INUSE TO CORE

- ▲ **Final packaged product**
 - **As experienced by consumers**
 - **As brewery fresh**
- ▲ **Beer prior to packaging**
- ▲ **Beer in-process**
- ▲ **Ingredients, processing aids, packaging materials**
- ▲ ***Complaints and non-conforming product***

What do beer tasters have to do?

Rate the intensity of flavors in beer

Identify flavor compounds in beer

Evaluate the quality of beer samples on the basis of their flavor

3

2

1



The ideal taster

THE IDEAL TASTER

Easy to train

Enthusiastic

Available

Reliable

Gifted



The ideal taster

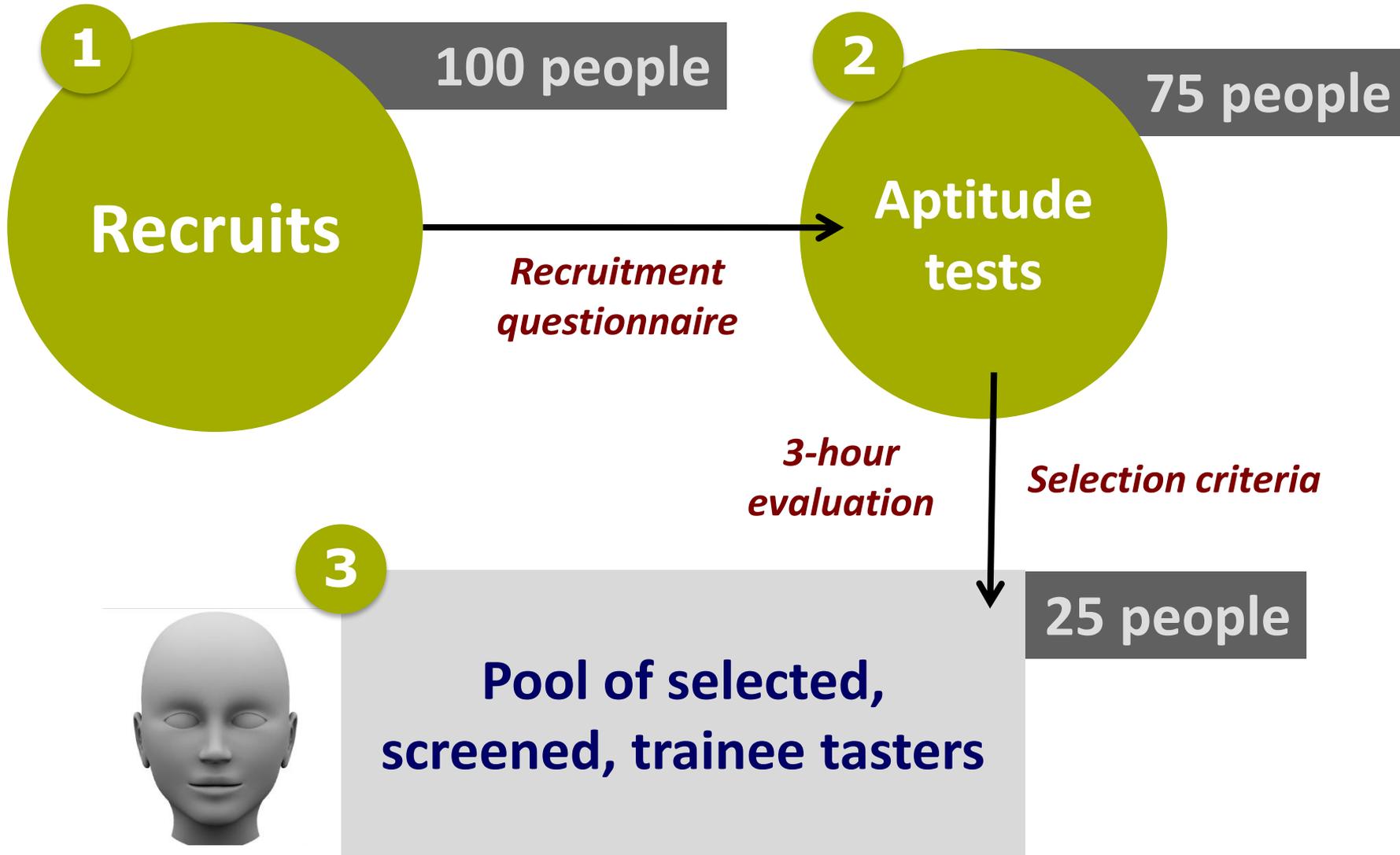
The ideal taster

**We have no
reliable means
of evaluating our
“gift” for tasting**

**We need help to
compare
ourselves to
others**



Trainee selection and screening



1 **2 samples**

Session #1
Warm-up session
Training in the correct way to evaluate beer samples

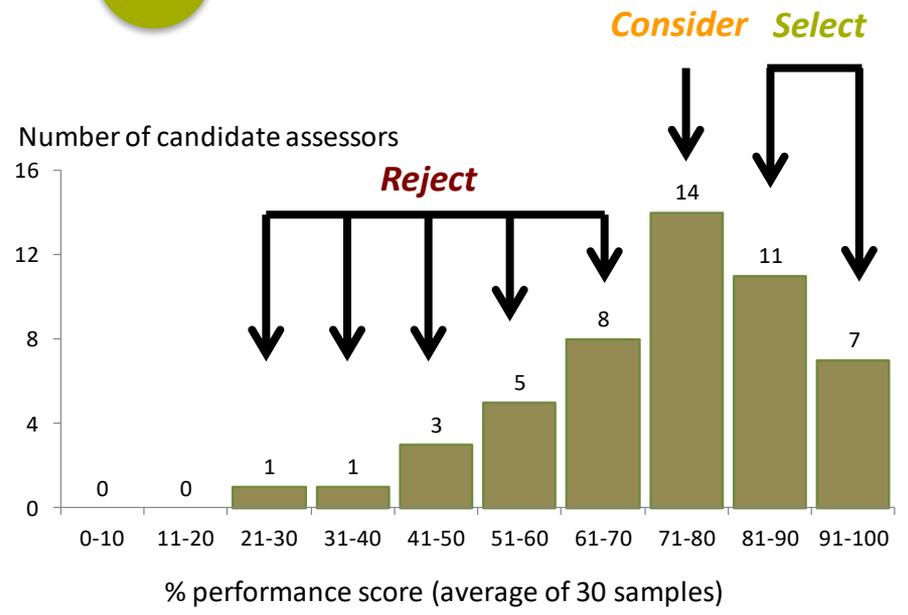
2 **11 samples**

Session #2
Recognition test session
Training to recognize 10 different flavors in beer

3 **11 samples**

Session #3
Recognition test session
Training to recognize 10 different flavors in beer

5



4 **10 samples**

Session #4
True / false test session
Blind testing of 10 beer samples



With the right people

right people



Training is easy

Scoring during training is high

Performance after training is good

Attendance levels at tasting are high

Beer used to train tasters should be



Fresh

Defect-free

There is NO requirement for beer to be neutral in flavor – if you make IPA, use IPA

It takes a lot of beer to train 25 tasters over 5 days!



materials, methods, environment

Plastic glasses – essential, rather than optional

materials, methods, environment



Taste forms – easy to understand, easy to use



TEST 6 – RECOGNITION TEST

Name

Date

You will be presented with 10 samples. All of these have one dominant flavour character compared with the control sample.

Using both your sense of smell and taste, describe the dominant flavour in each sample.

Sample number	Dominant flavour
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Possible flavour characteristics:

butyric, citrus hop, damascenone, diacetyl, ethyl butyrate, ethyl hexanoate, isoamyl biscuity, mercaptan



TEST 7 – TRUE / FALSE TEST

Name

Date

You will be presented with 10 samples. Please decide whether the statements below are true or false for each sample by placing a tick in the appropriate column.

You must make a choice in each case.

Sample number	Statement	True	False
1	This sample has an acetic flavour		
2	This sample has an isovaleric flavour		
3	This sample has a metallic flavour		
4	This sample has a musty flavour		
5	This sample does not have a grainy flavour		
6	This sample does not have a sulphury flavour		
7	This sample has a smoky flavour		
8	This sample does not have a sour taste		
9	This sample has a bitter taste		
10	This sample has a diacetyl flavour		

Delegate documentation – informative and detailed

materials, methods, environment

A brief guide to the flavor of beer

Close to 200 chemicals determine the flavor of the wide range of beer styles enjoyed by consumers today. These include almost 100 positive flavor characteristics and a similar number of off-flavors and taints. These flavors originate from raw materials, process conditions, microbiological contamination, or tainted processing aids or packaging materials. Training to detect and identify such flavor notes involves tuition and practice. This is best done using beer samples to which low levels of individual 'sensory-pure' flavors have been added.

This short guide describes 48 of the most important flavor characteristics found in beer.

With few exceptions the names used to describe these flavors are those recommended by global brewing industry authorities, including the European Brewery Convention (EBC), American Society of Brewing Chemists (ASBC), Master Brewers Association of the Americas (MBAA), and Brewing Congress of Japan (BCOJ).



Key
 1 mg / l = 0.001 g/l (parts per million)
 1 µg / l = 0.000001 g/l (parts per billion)
 1 ng / l = 0.000000001 g/l (parts per trillion)

World Brewing Congress
 Denver, USA 12 August 2016

Icon	Attribute	Chemical	Assessment	Threshold	Origins	Importance	Remarks	Flavor category
	Acetaldehyde	Acetaldehyde	Cover the beer with your hand and swirl the glass to release the aroma. Remove your hand and take a single long sniff. Repeat as necessary.	5 mg / l	Produced by yeast during fermentation. Indicative of fermentation problems and poor control of dissolved oxygen in packaging of beer.	Present in all beers. Characteristic flavor of some beer styles, eg Bière de Garde (French Country Beer). Off-flavor at high concentrations.	The flavor impact of acetaldehyde is influenced by the sulfur dioxide concentration in the beer. Addition of sulfur dioxide to beer suppresses the flavor of acetaldehyde.	Off-flavor
	Acetic	Acetic acid	Without covering the glass, swirl the beer to release the aroma. Take a single short sniff. Repeat as necessary.	90 mg / l	Produced by yeast during fermentation. Too much yeast growth, contaminating bacteria and wild yeasts can produce excessive levels.	Present in all beers. Characteristic flavor of some beer styles, eg Lambic beer from Belgium. Off-flavor at high concentrations. Common problem in draught-dispensed beers.	The intensity of this flavor increases with decreasing beer pH value. Also produced by <i>Brettanomyces</i> yeasts prominent in barrel ageing.	Off-flavor

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excellence in professional tasting

Pure beer flavor compounds – covering all important attributes



- ▲ Free of sensory impurities
- ▲ Stabilized by encapsulation
- ▲ Extensively analysed and validated
- ▲ Added to beer to create training samples

The importance of “sensory purity”

99.9%

- ▲ Each of us is “blind” to several flavor compounds - this genetically-inherited ‘blindness’ is called anosmia
- ▲ Trace contaminants are often present in odour-active chemicals
- ▲ Their presence can cause people who are anosmic to a specific chemical to believe they can detect it, and others to mistake its flavor character for something else

*GC-
olfactometry
can be used
to assure the
sensory
purity of
flavor
standards
used in
training*



Beer flavor quality training course

Training course for 25 people

Day 1	Day 2	Day 3	Day 4	Day 5
Recognition test	Recognition test	Recognition test	Recognition test	Quality assessment test
Recognition test	Recognition test	True-false test	Stop-go test	Quality assessment test
Recognition test	True-false test	Recognition test	Stop-go test	Quality assessment test
Recognition test	Recognition test	Recognition test	Recognition test	Revision session
	Recognition test	Stop-go test	True-false test	Flavor identification test

Typical flavors - craft beer training

materials, methods, environment



Beer flavor quality training course

▲ 5 days

▲ 24 sessions

▲ 40 flavours

▲ 250 samples

90%

correct answers

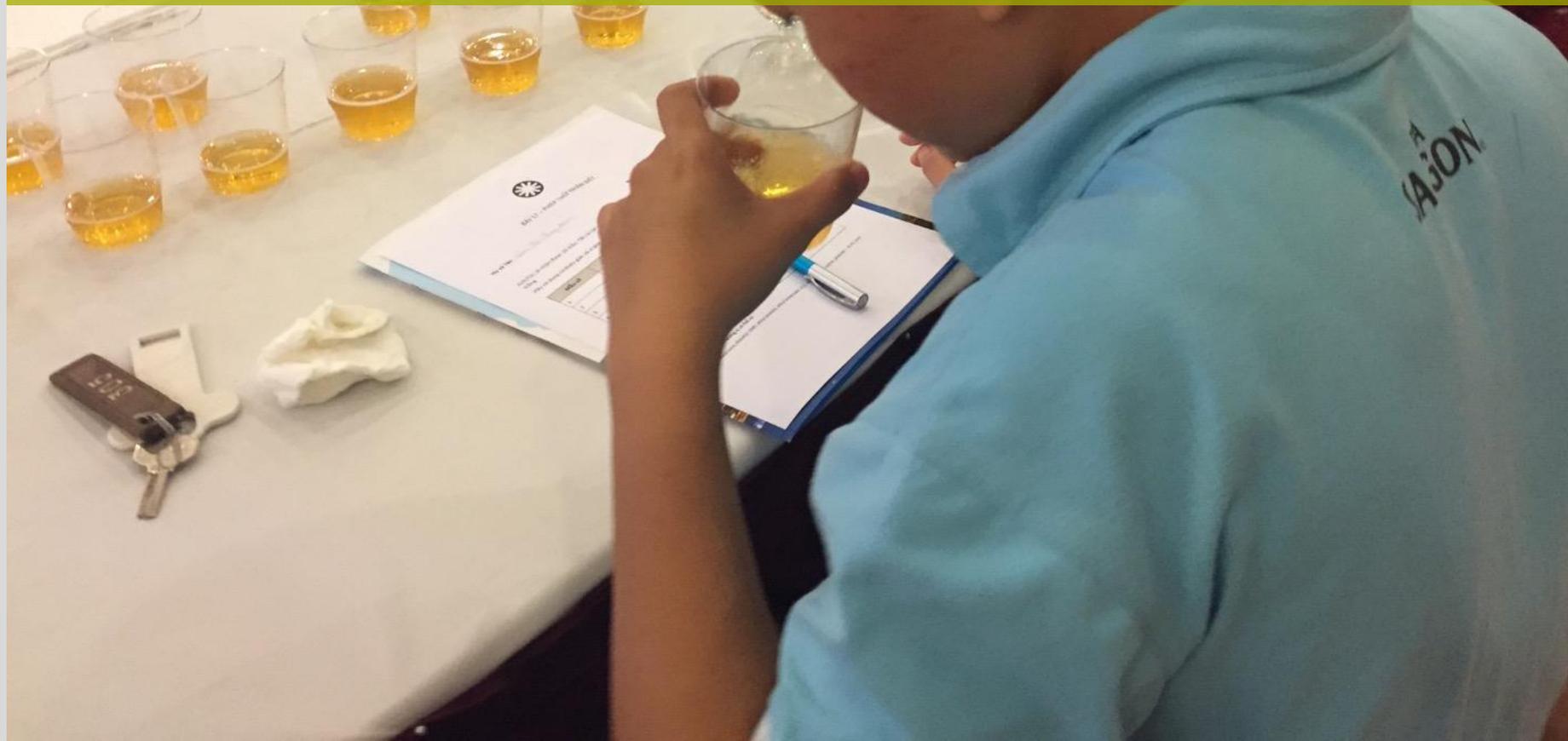
100%

80%

materials, methods, environment



The training environment is less important than having the right people, tools and approach – and trainer



materials, methods, environment

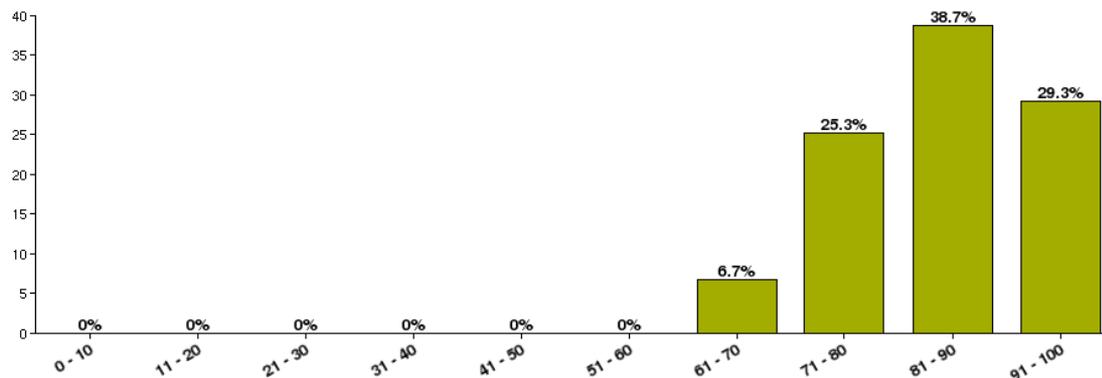


Objective validation of assessor performance

Measure
Measure
Measure

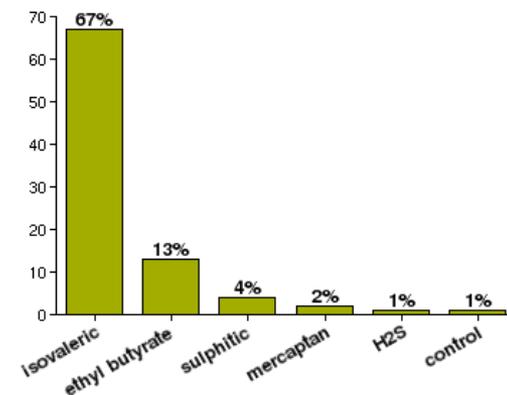
validation of assessors and tests

panel performance comparison

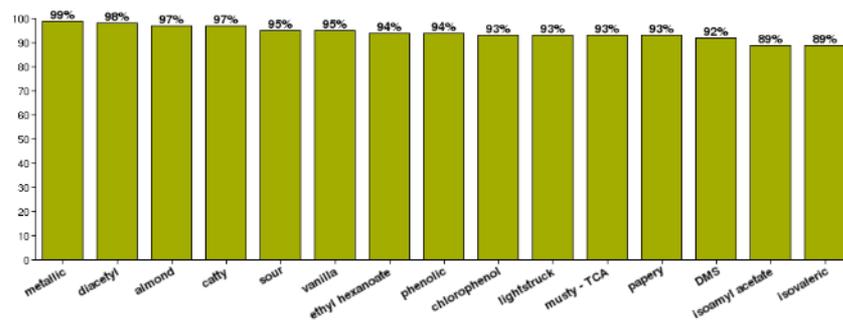


butyric (68% results correct - 32% results incorrect)

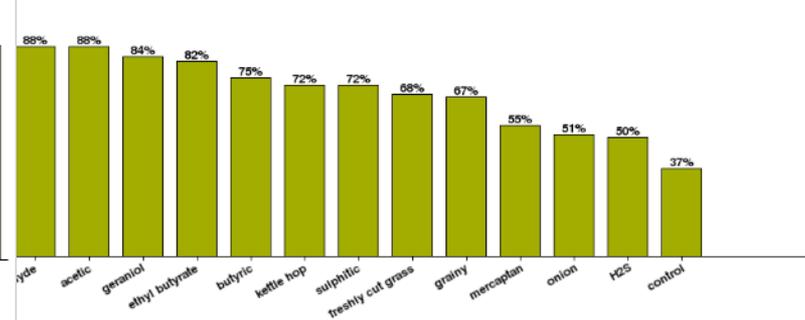
[The information below shows the %'s of the incorrect results]

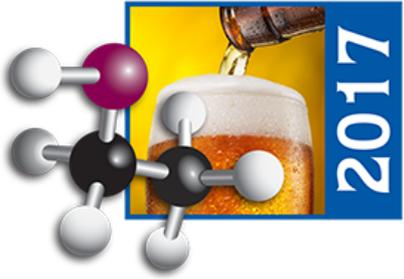


attribute performance chart (1/2)



attribute performance chart (2/2)





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4. Training of taste panel leaders

Roles of the taste panel leader

- ▲ **Manage the sensory program**
- ▲ **Train the tasters**
- ▲ **Monitor the performance of the tasters**
- ▲ **Select the samples**
- ▲ **Execute the sensory tests tests**
- ▲ **Report the results**

Attributes of a good taste panel trainer

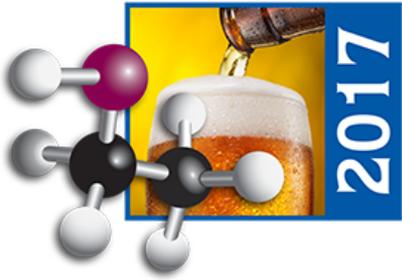
- ▲ Knowledgeable
- ▲ Flexible and resilient
- ▲ Positive and enthusiastic
- ▲ Reliable
- ▲ Organized and systematic
- ▲ Attentive to details
- ▲ Focussed on the learner



Attributes of a good taste panel trainer

- ▲ Great communicator
- ▲ Good with numbers
- ▲ Great taster
- ▲ A great leader





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5. Taking action on the results

Test results

1925 1027112

Quality assessment

Example results – sample 847

Average quality score

6.7

Non-conformances

Diacetyl

8 assessors

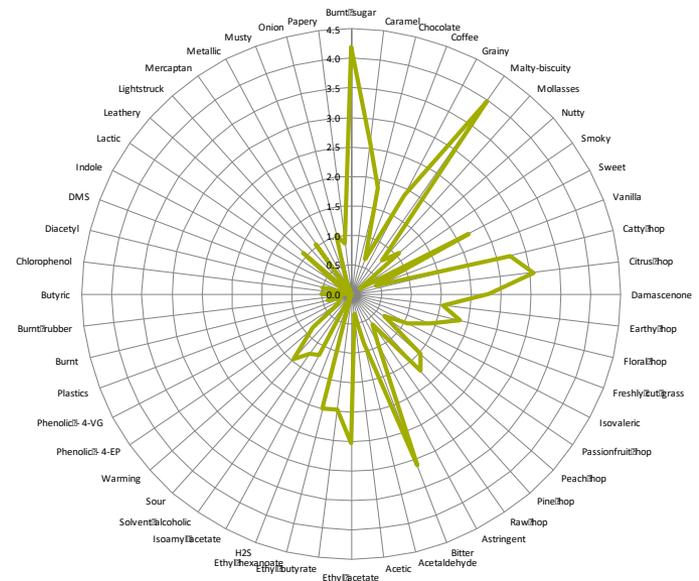
Acetic

4 assessors

Lactic

3 assessors

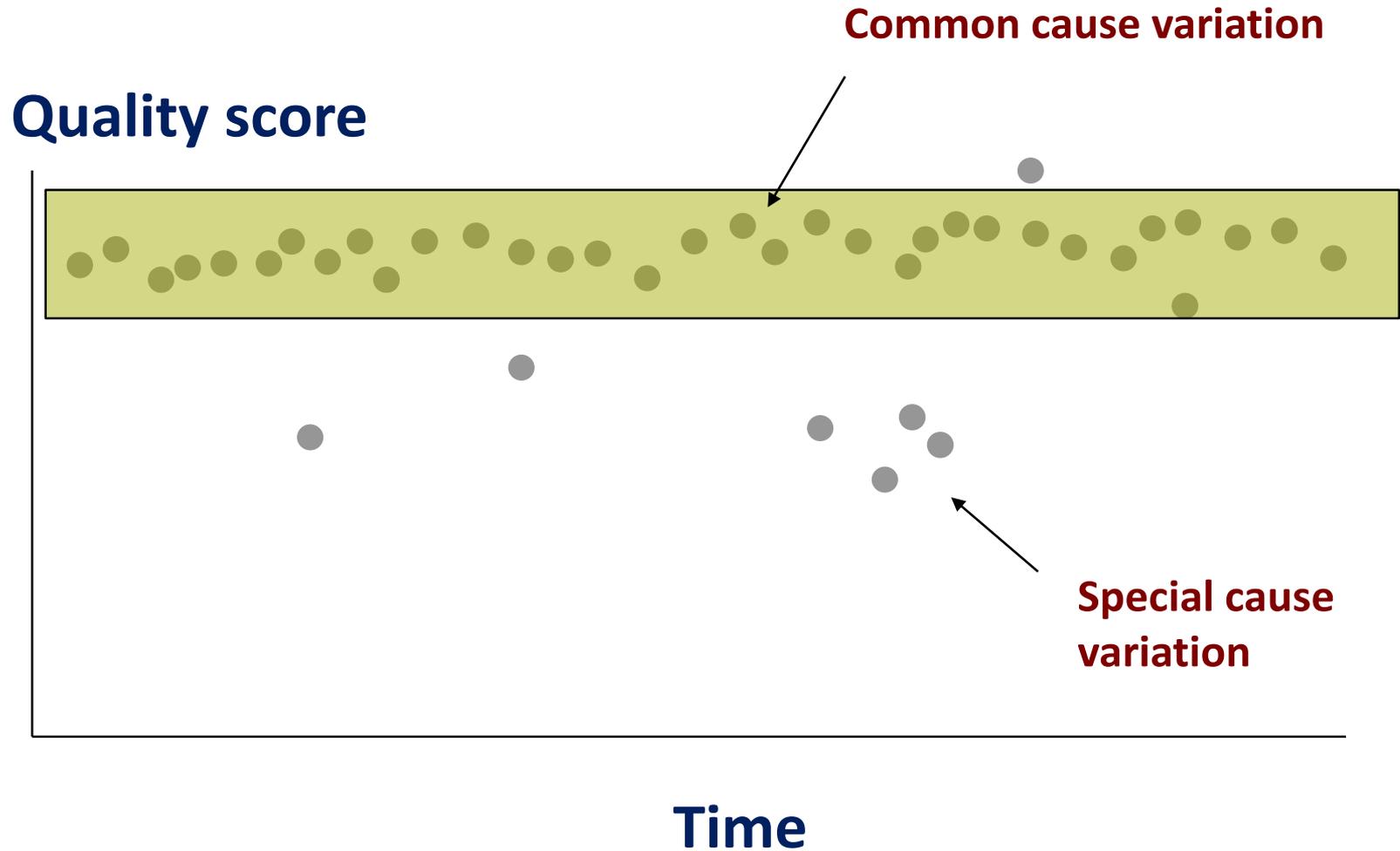
Descriptive profiling



**The key to
responding to the
results of taste
tests is knowing
when to take no
action**

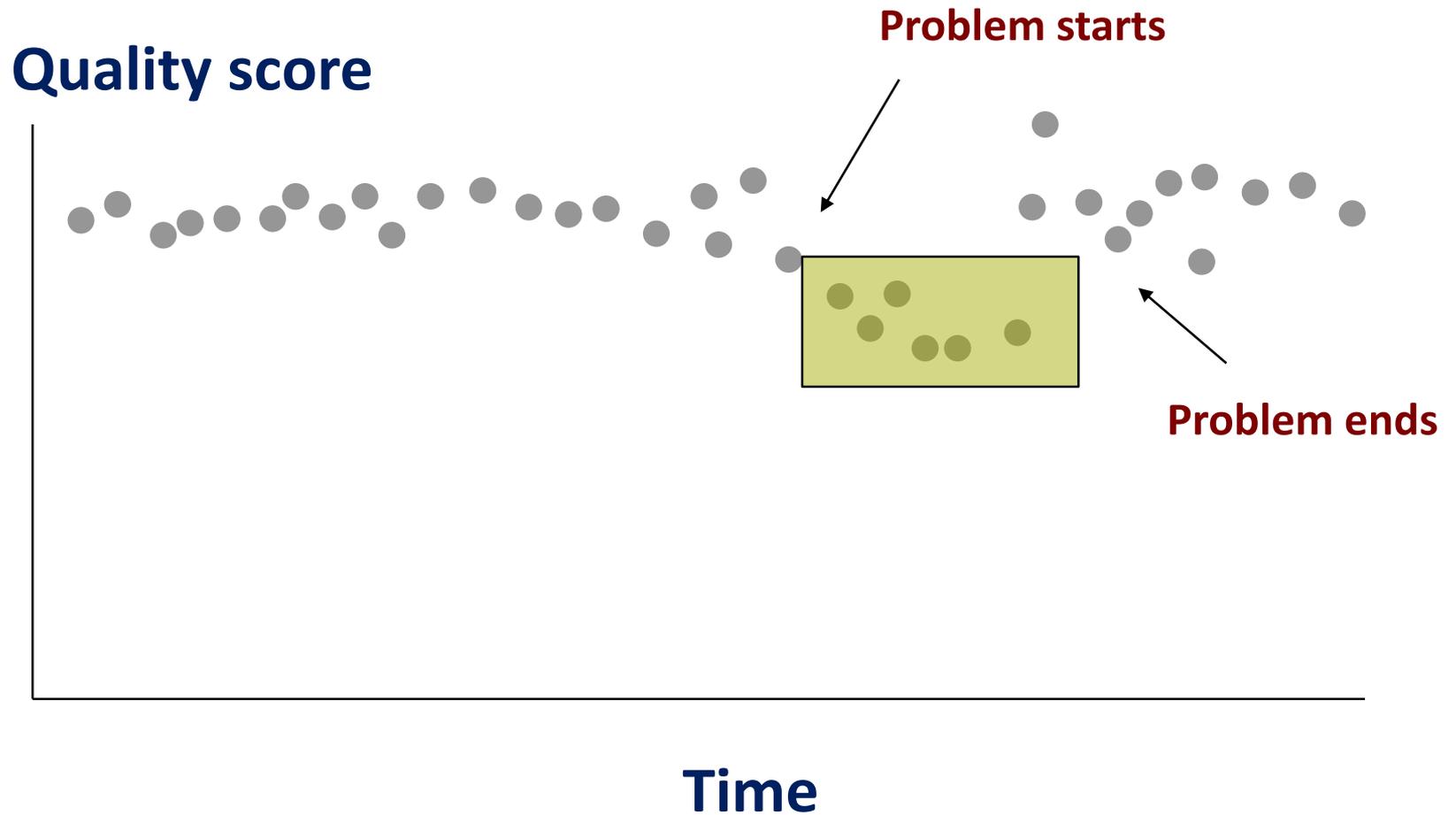
Types of variation

Types of variation



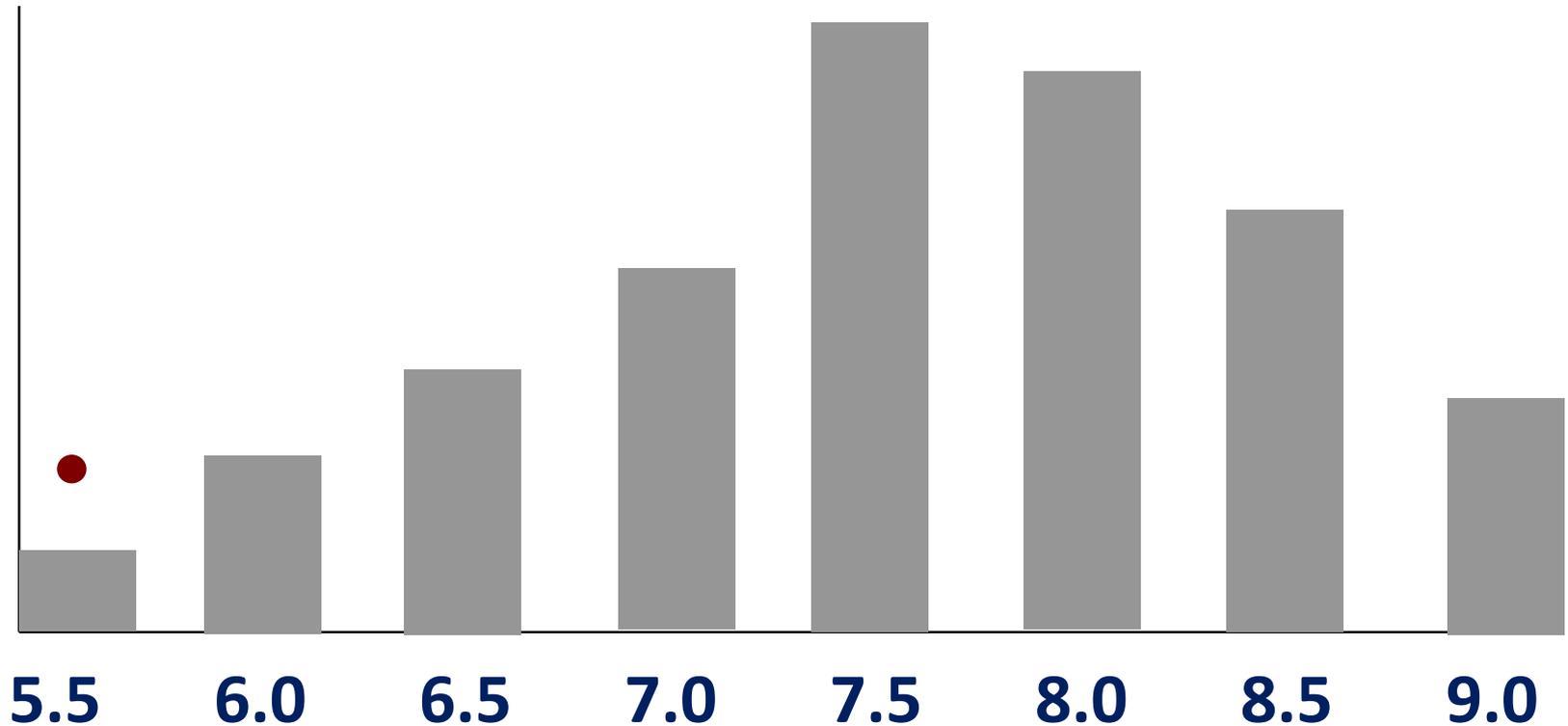
Tools – Run Chart

TOOLS – RUN CHART



Tools – Frequency Histogram

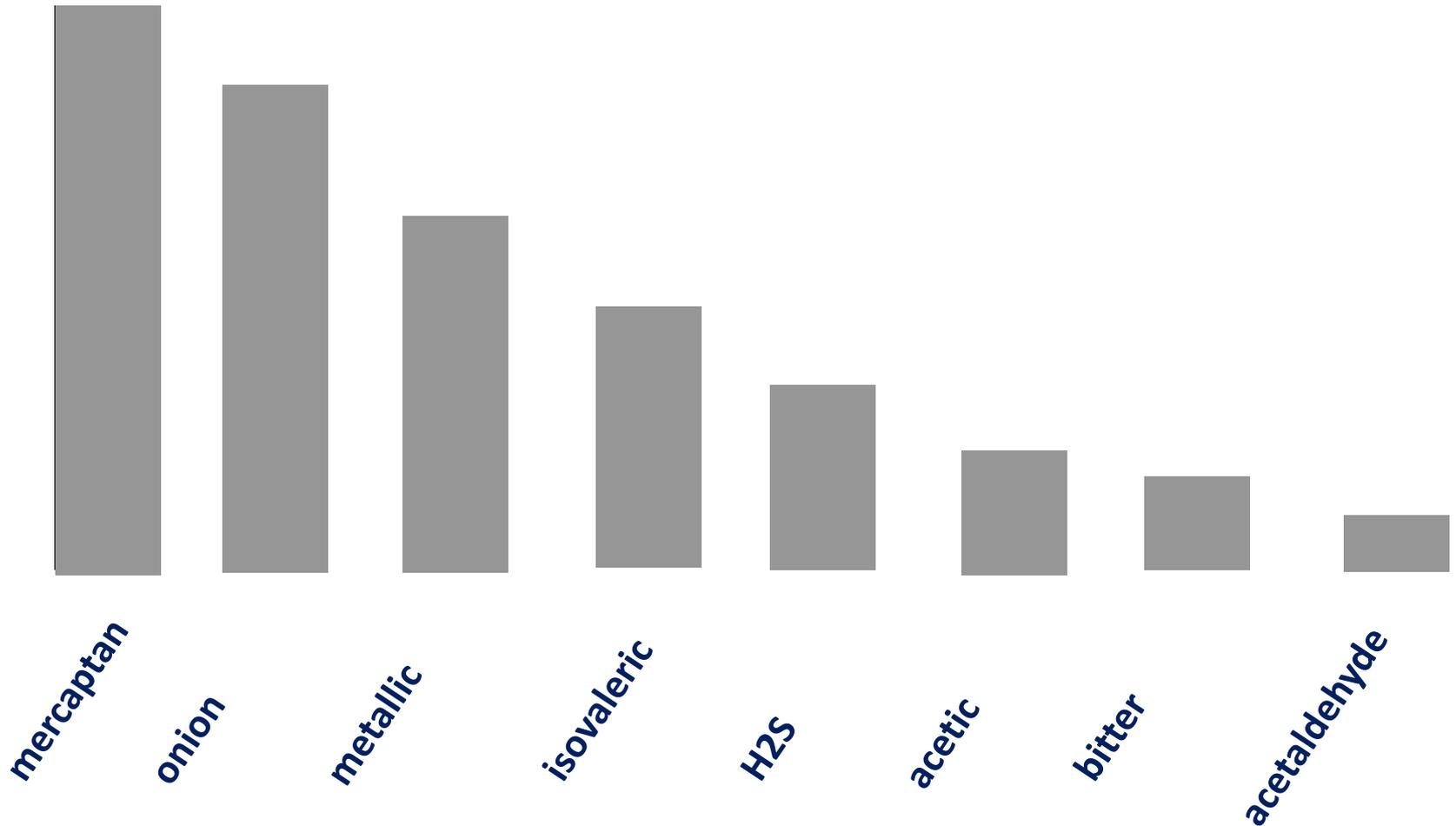
% of samples



Tools – Pareto Chart

100% — 50% — 25% — 12.5% — 6.25% — 3.125% — 1.5625% — 0.78125%

% of non-conformances



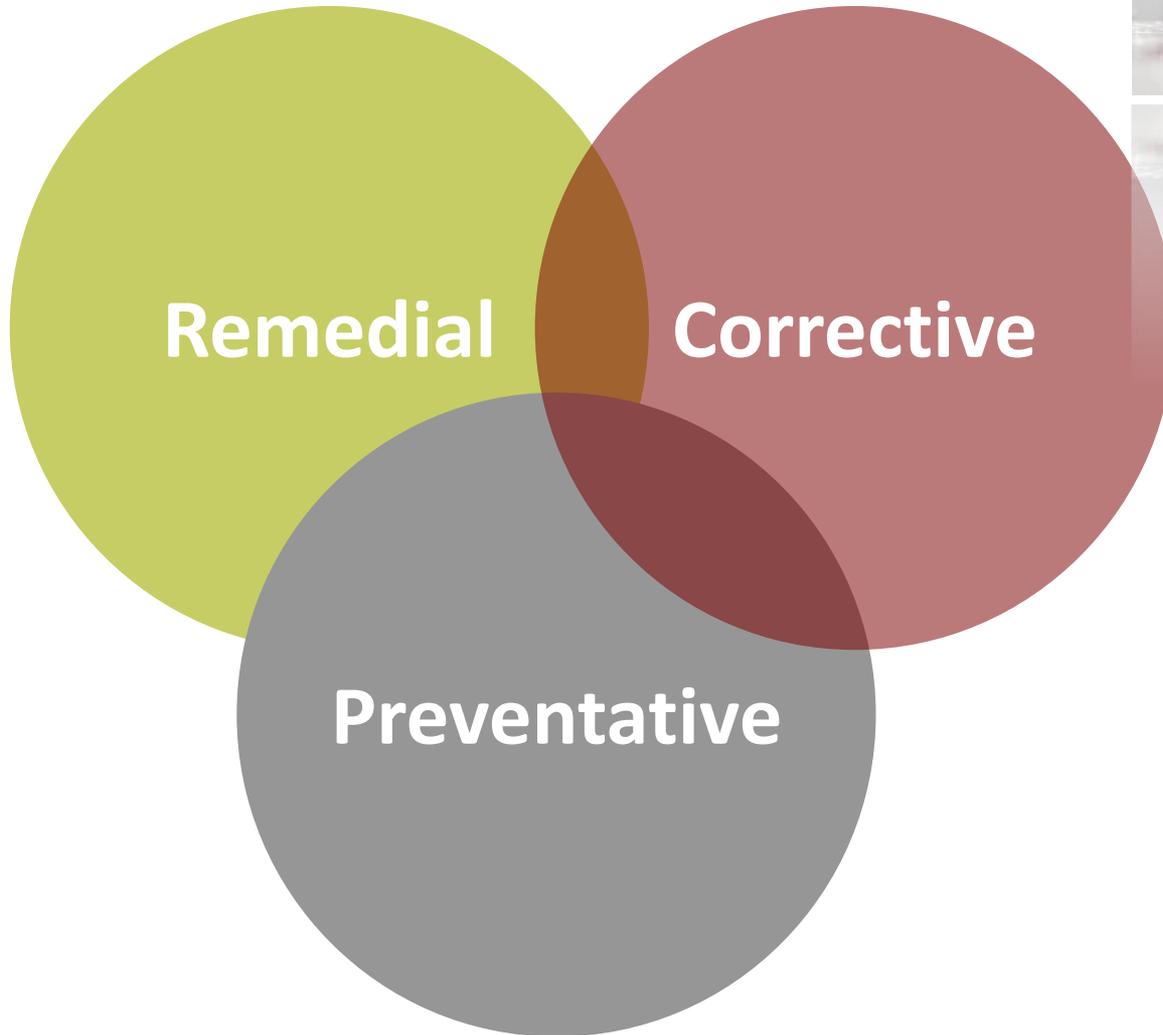
The right time to act

- ▲ Indication of potential safety risks
 - Alkaline, soapy, premature oxidation
- ▲ Indication of microbiological issues
 - 4-EP, 4-VG, styrene
- ▲ “Significant” flavor non-conformances
 - Taints, off-flavors, atypical flavor profile

Chemical testing can be used to support decision making – *eg* diacetyl / pentanedione ratio in response to a diacetyl flavor issue

Types of actions

Types of actions

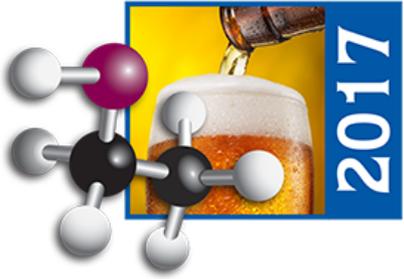


Summary

Be clear on

- ▲ **What to test**
- ▲ **When to test**
- ▲ **How to test**
- ▲ **When to take action**
- ▲ **The aim of any proposed action**
- ▲ **The specific actions required**





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5. Summary and conclusions

Summary and conclusions

- ▲ **Train the selected few and train them well**
- ▲ **Train often and measure performance**
- ▲ **Design and execute tests with action in mind**
- ▲ **Analyse and understand multiple test results before taking action**
- ▲ **Measure again after taking action to confirm the effectiveness of what's been done**

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