# AUTOMATED DROWNING DETECTION SYSTEM OVERVIEW & DEVELOPMENTS

# INDUSTRY UPDATE

## PWTAG CONFERENCE NOVEMBER 2019

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**GLL & BSI SWIMMING POOLS &
AQUATICS COMMITTEE  WG4**

# Today

- Background
- The changing regulatory position
- Systems overview – what's on the market
- Advice for operators

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# The current position

Fact - Industry staff are:
- ➢ Well trained
- ➢ Well qualified
- ➢ Good at responding once an incident has been detected.
- ➢ Often alerted to bathers in difficulty by other swimmers

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# The current position



- Industry Fact -  Lifeguards miss 40 % of  incidents and are usually alerted to a situation by customers

- The "Jeff Ellis" report puts the figure as high as **86 %** of incidents are missed by lifeguards within the 10:20 system.

- In a study of over 500 simulated incidents carried out by Ellis, 14 % of incidents took over 3 minutes to detect.




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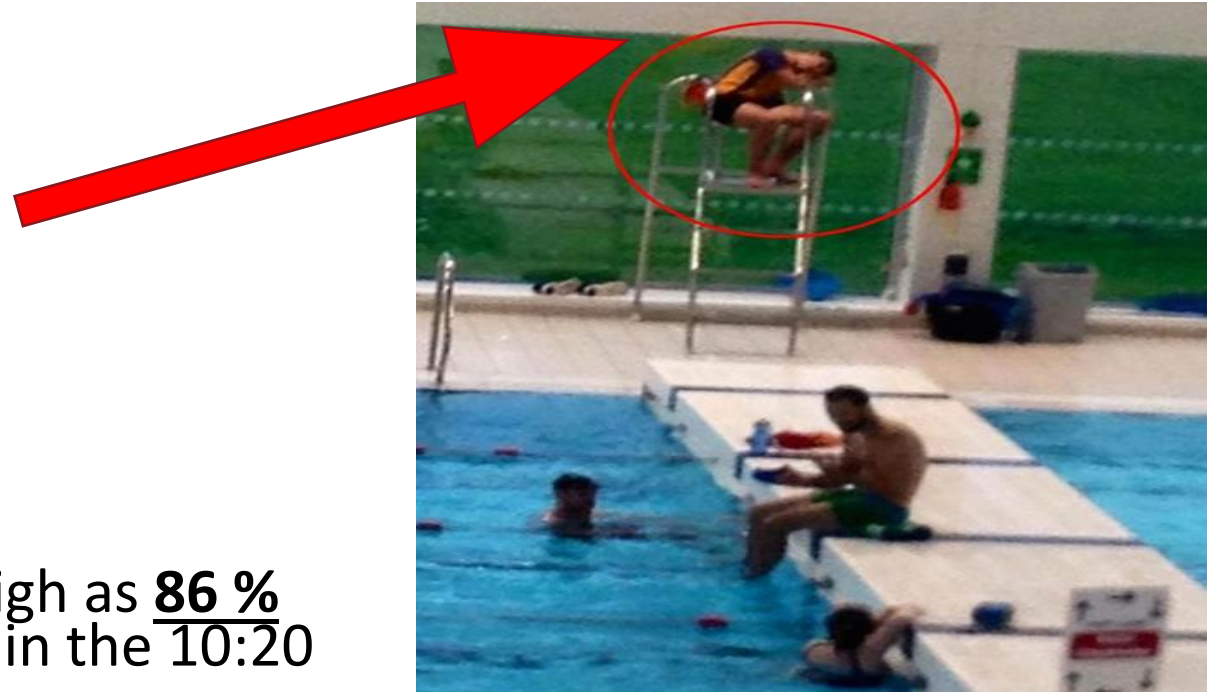
# Lifeguards look, but they don't always see

- Lifeguard's duties can be compromised by
  - Surface reflection/glare
  - Environmental Factors – particularly heat and noise
  - Distraction
  - Physical Factors
  - External Distraction
  - Perceptual and Attentional challenges
  - Stimulus challenges

- **CCTV *Can* offer the lifeguard a view of what they normally can not see ….. But it has its limitations.**

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# If using CCTV……

- How does scanning the monitor blend with the 10: 20 system.

- Is it really practical to ask someone to look at a number of images on a monitor at short distance, then refocus on the pool at large ?

- How does this affect Lifeguards who wear spectacles ?



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# Possible Solutions

# Market summary

| | |
|---|---|
| Angel Eye | Italian |
| Swim Eye | Norwegian |
| Poseidon | French |
| Sentag | Swedish |
| Blue Fox | Swiss |
| Pool View Plus | British |
| NAGI | Spanish |
| Coral Manta | Israeli |

Not exhaustive – there are others out there…..

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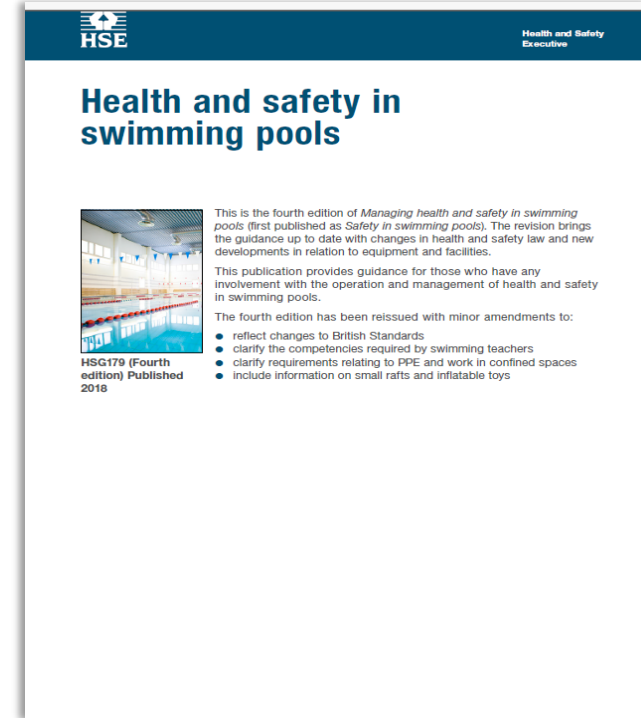GROUP

# The Industry Vision ?



- Safer Pools for everyone
- Pools that are monitored by Technology, not the human eye
- Staff that become responders
- Staff that become "Engagers" - and talk to customers
- Staff that are Educators and Encourage participation

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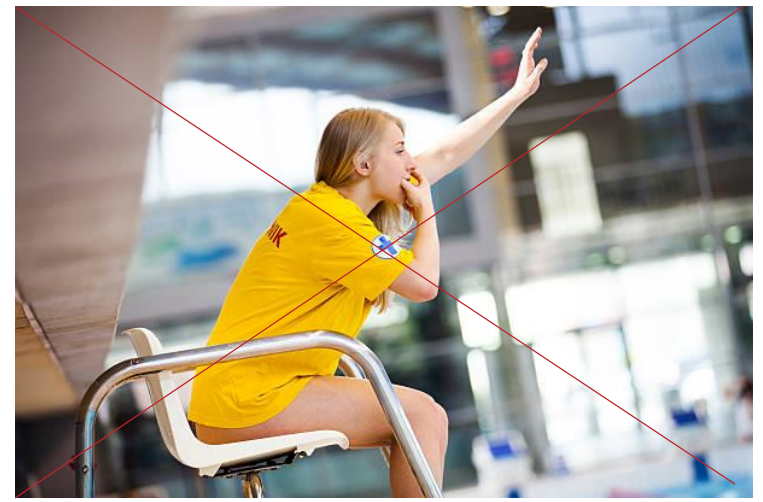
# The (current) legal perspective:

**HSG 179 (Fourth Edition) 2018.**

- **Expressly acknowledges these systems, in the 2018 version ( para. 119 & 120)**

- **This is guidance only ( not an ACOP), but usually the starting point for regulatory authorities.**

- **There is ambiguity about how/ and if "tech" can replace lifeguards.**

- **But the document does not go far enough…….**



**HSE**  Health and Safety Executive

## Health and safety in swimming pools

This is the fourth edition of *Managing health and safety in swimming pools* (first published as *Safety in swimming pools*). The revision brings the guidance up to date with changes in health and safety law and new developments in relation to equipment and facilities.

This publication provides guidance for those who have any involvement with the operation and management of health and safety in swimming pools.

The fourth edition has been reissued with minor amendments to:

- reflect changes to British Standards
- clarify the competencies required by swimming teachers
- clarify requirements relating to PPE and work in confined spaces
- include information on small rafts and inflatable toys

HSG179 (Fourth edition) Published 2018

*Drowning detection systems*

119 Drowning detection systems use cameras and computer software to detect a swimmer who may be in difficulty. They can comprise of over and/or underwater cameras linked to a computer, which analyses the information in real time to identify a casualty and sounds an alarm. When considering the installation of such a system, make sure you know what it is capable of. Do not assume that it can detect all possible drowning accidents unless the manufacturer is able to guarantee this. Ask the manufacturer or your supplier about any limitations, because not all systems are the same, for example some cannot detect a person floating on or just under the surface of the water.

120 A procedure should be established by the operator to ensure that all alarms generated by the system are responded to promptly. Where computerised drowning detection systems are installed, staff must be trained in their use. Training should take account of the manufacturer's instructions as well as the PSOP. Operators should make sure the equipment is tested and maintained in accordance with the manufacturer's instructions.

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# The (current) legal perspective:

**BS EN 15288 – Part 2**

# The (current) legal perspective:

**BS EN 15288 – 2:2018**

A significant change in the text. (page 20)

"Technical systems for supervision , (eg drowning detection systems, to detect users in difficulty and to warn the pool staff) shall not **TOTALLY** replace human supervision but can be provided as an aid to assist supervision."



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# The (current) legal perspective:

## BS EN ISO 20380:2017

Public Swimming Pools – Computer vision systems for the detection of drowning accidents in swimming pools - Safety Requirements and test methods.

<u>Unhelpfully</u> ( page 9)

" Installation and use of computer vision systems ***cannot*** serve as a reason to reduce human monitoring"
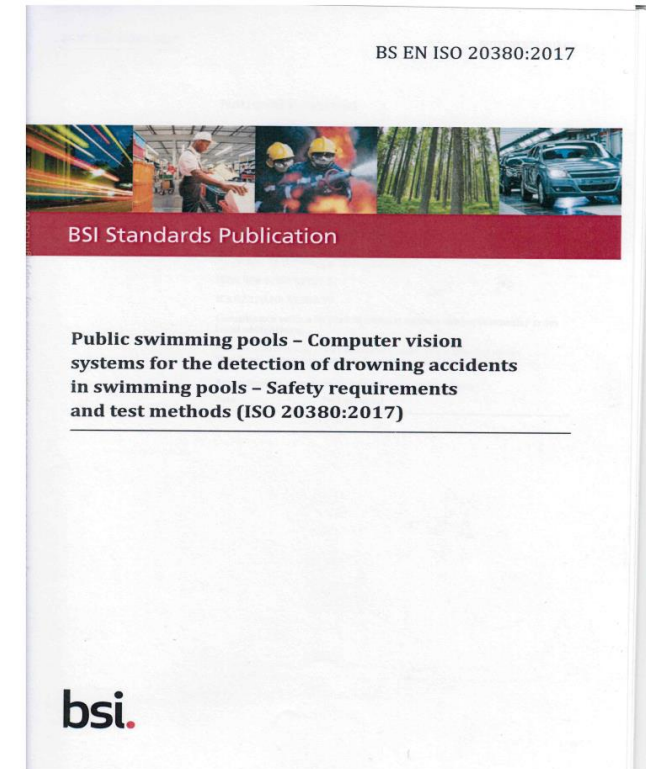
BS EN ISO 20380:2017

BSI Standards Publication

Public swimming pools – Computer vision systems for the detection of drowning accidents in swimming pools – Safety requirements and test methods (ISO 20380:2017)

bsi.

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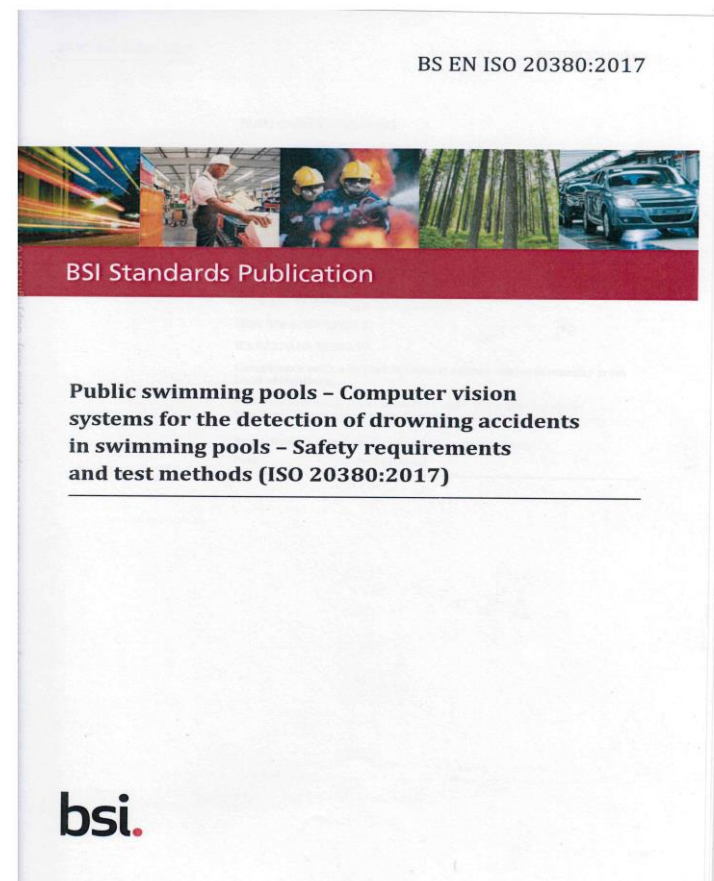
# BS EN ISO 20380:2017

## BS EN ISO 20380:2017

- **International Standard**

- **UK's view is that it is biased to one particular type of system.**

- **Germany, Canada & Norway appear to share this view.**



BS EN ISO 20380:2017

**BSI Standards Publication**

Public swimming pools – Computer vision systems for the detection of drowning accidents in swimming pools – Safety requirements and test methods (ISO 20380:2017)

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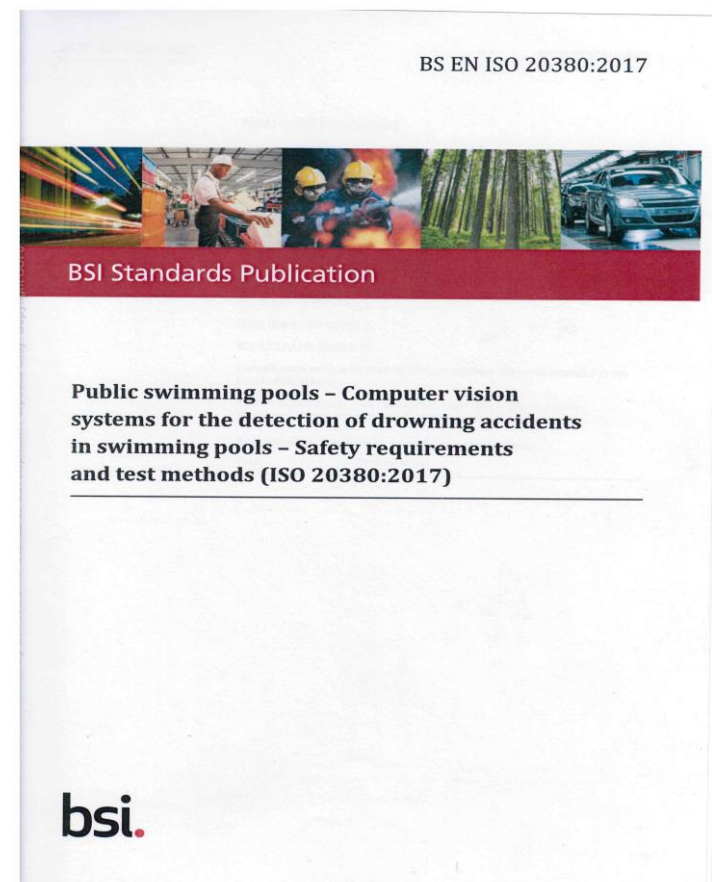
# BS EN ISO 20380 – WHATS THE ISSUE ?

- **The "Test Regime" is under perfect conditions. ( Good light, good clarity, no swimmers).**

- **The test manikin – must wear a black female swimsuit. – Making it highly visible.**

- **The standard simply isn't high enough, a "pass" is achieved if an 85% detection rate is achieved.**

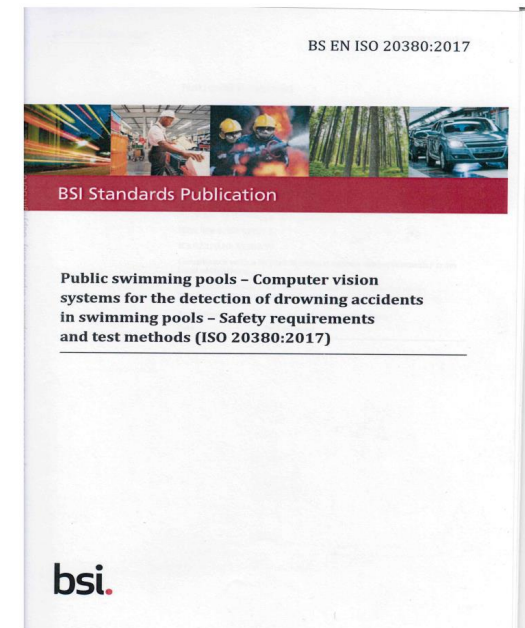- **Would you drive a car if the brakes failed 15% of the time ?**

# BS EN ISO 20380:2017

**UPDATE FROM THE CORSICA MEETING 2019**

TWO APPROACHES WERE EXPRESSED BY MEMBERS:

1. To extend the Scope of the existing document.

2. Maintain the Current Scope.

- If the Current scope was extended this would need approval from the ISO mother committee

- Consensus was not achieved and will be discussed at the next meeting.

BS EN ISO 20380:2017

**BSI Standards Publication**

Public swimming pools – Computer vision systems for the detection of drowning accidents in swimming pools – Safety requirements and test methods (ISO 20380:2017)

bsi.

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# BS EN ISO 20380:2017

## NEXT MEETING TORRONTO 2020

- Take a view on the approach of Norway/Canada/ Germany who were meeting last week. Who all put up proposals

- Arrange a conference call with the above in January.

- Find a way to fund a British Delegate to attend the Torronto meeting.



BS EN ISO 20380:2017

BSI Standards Publication

Public swimming pools – Computer vision systems for the detection of drowning accidents in swimming pools – Safety requirements and test methods (ISO 20380:2017)

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# UK Active work

Pools Technology Working Group now formed.

- This has been accepted as a sub – committee of UK Actives the Standards and Legislation Committee.

- UK Active have commissioned a research piece funded by Sport England

# Summary of research proposal

- Independent Research
- In depth investigation into evidence around the systems
- Engagement with Operators and Lifeguards
- Review of documentation
- Review of systems
- Testing
- Testing against enhanced standards
- Focus groups
- Swim England & IQL are part part of the stakeholder group.
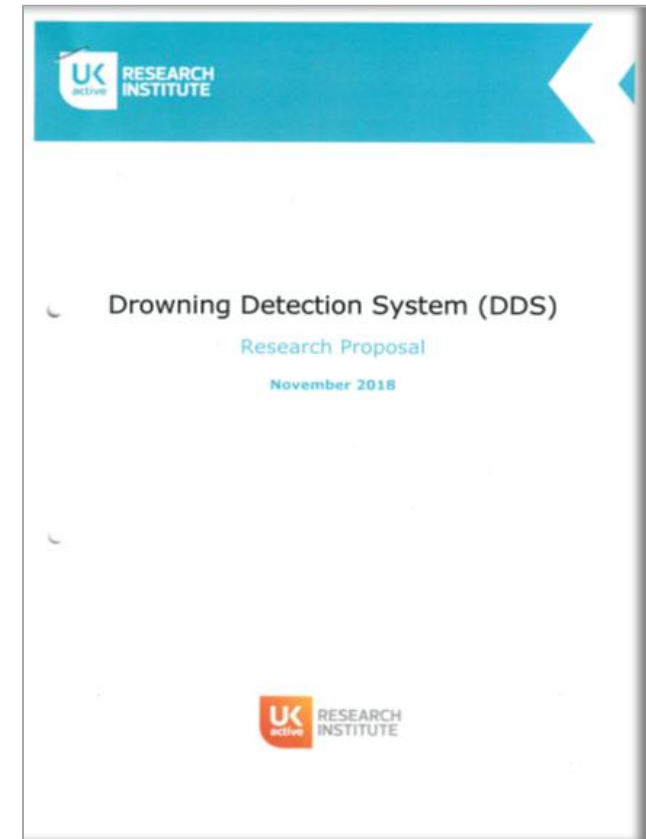
# Swim England & Sport England

Swim England's Design forum now have drowning detection on the Agenda and the Design forum will be releasing a briefing note in due course.
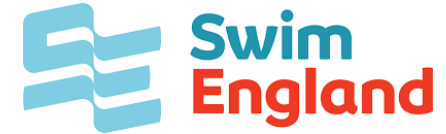
Sport England's Latest position is:

"The HSE guidance 179 'Health and Safety in Swimming Pools' was reviewed and refreshed in 2018. HSE 179 covers drowning detection systems and so, as the Sport England note was becoming out of date it was decided to remove it to prevent any confusion".

# A brief overview of the systems...

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# Sentag



- Swedish product distributed through a network of suppliers
- Based on a chipped wristband
- Monitors if a band (swimmer) goes below a predetermined depth for a predetermined time.
- Underwater sensors are installed to detect the bands
- Can be linked to cameras, alarms, and sirens, lockers and access control
- Installed at the Mandarin Hotel – London.

# Angel Eye

- Italian system
- 60 installed world wide ( Europe).
- Uses underwater cameras to convert people into "objects" and then to algorithms.
- Detecting unusual activity, stationary objects, or movements beyond predetermined boundaries.
- Alerts lifeguard via a palm top.
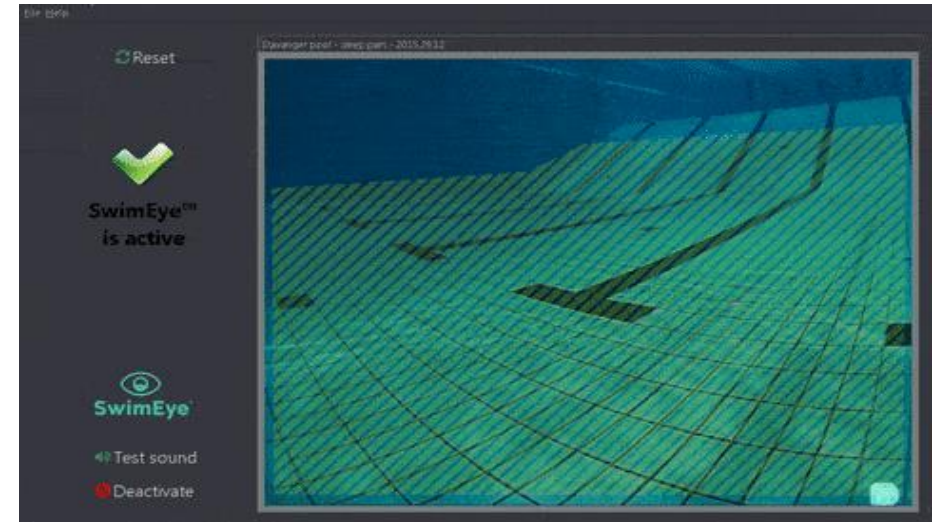- Distributed by the "Swimming Pool Safety Company"
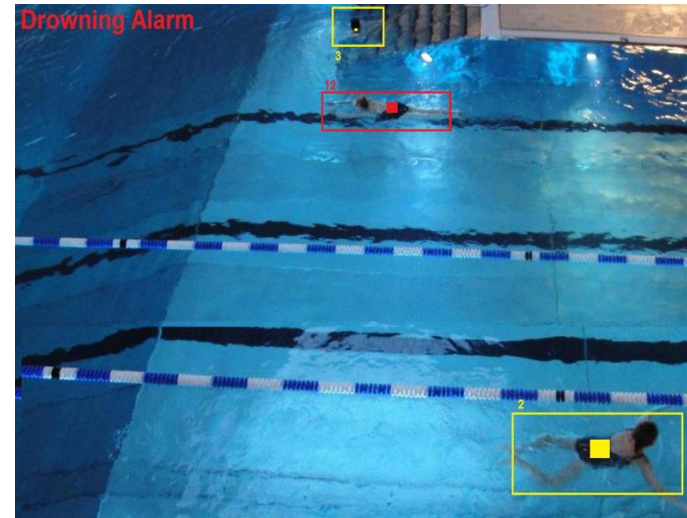
# Swim Eye



- Norwegian System
- Purports to track up to 2000 individuals at anyone time.
- Good coverage in Sweeden and Norway
- Again, uses underwater cameras.



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# Pool View Plus

- Distributed by Poolview

- Uses underwater cameras to detect unusual behaviour, which generates an alert.

- Lifeguards can also "track Swimmers" on the CCTV monitor.

- Developed in the UK.

- Currently being installed at the London Aquatics Centre

POOLVIEW™ plus⁺



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# Blue Fox

- Wearable bracelet Technology
- Set depth and time parameters
- Ultrasonic signal sent to the base unit
- Installations in Australia, Austria, Belarus, Cambodia, France ( 17 +)
- Complies with the DIN standard on drowning detection.
- Releases a "bladder" which rises to the surface of the pool.

# Coral Manta

- Floating Camera based system
- No installs in the UK ??
- Solar powered
- Probably more suitable for the Domestic or small installations

# Poseidon

- Subsidiary of an Israeli Company (Maytronics LTD) – European offices in France
- 230 installations world wide
- Recognizes texture, volume and movement within the pool
- Differentiates between "normal" activity and "suspicious" activity
- Works with and overhead "dual camera" system. ( 1 standard and 1 infrared) underwater cameras now being introduced for pools over 2.5 metres deep.
- Tracks trajectory of victim to the bottom of the pool and counts 10 seconds before sounding an alert
- Sounds audible alerts and flashes an LED display of victim's location coordinates

# Conclusions

- Artificial Intelligence is coming and the sector needs to be alive to it.

- The regulatory framework is moving in the right direction, but this is a journey and more work needs to be done.

- Where you are influencing designers and builders – future proof new facilities, with containment and niches.

- Think about, rack space and lifeguard chair positions at design stage.

- Look carefully at the different systems, some may be more suitable than others for your environment and requirements.

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