BRANDWEER

Brandweeracademie

11th International Fire Instructors Workshop (IFIW)

A report

De Brandweeracademie is onderdeel van het Instituut Fysieke Veiligheid.

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Preface

In 2019, the Fire Service Academy (part of IFV) and CFBT-NL had the honour of organizing the International Fire Instructors Workshop (IFIW) and International Fire Instructors Conference (IFIC). Each year, this event is held in different places around the world; it brings together experts from all over the world with a connection to the field of Fire, Fire Behaviour, Fire Fighting and the education and training of firefighters. These experts embody a mixture of science and practice, as they are academics, fire instructors and experienced firefighters or officers.

The IFIW is a unique event where knowledge and experiences with fire and education are exchanged and where strong networks and connections are created. This year the experts were challenged to determine universal principles for firefighting. The discussions that were held about this topic were very interesting and brought forward the contexts of the statements that had been proposed earlier. Judging by the positive reactions from all participants, the meeting has been an inspiring and successful event.

As we strongly believe in the international exchange of ideas, knowledge and experience, we will continue to organize events like this, thereby strengthening the growing network. The organization of this event was an adventure in itself, with CFBT-NL and the Fire Service Academy working closely together and having to improvise a lot. With the help of many colleagues we nevertheless succeeded.

I would like to thank you, participants, for your active presence and input. A special thanks goes to my colleagues who made a huge effort to organize this exchange: Jan, Marije, Monique and Deborah. Without you, this exchange would not have been such a success!

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Introduction

History of IFIW and objectives

From 2008 onwards, a group of fire scientists and instructors from all over the world has assembled annually to discuss issues concerning fire behaviour, firefighting and fire education. The first time they met at the invitation of Stefan Svensson in Sweden, and last year they celebrated the 10th anniversary of the group. The group shares knowledge through literature review, experimentation, lecture and debate within the fire service community of practice. Over the last decade, it has expanded to a group of around thirty people, who have the objective of continuously learning from each other and of translating theory into practice. During the first days of their annual meeting they always have a discussion as a group, called the International Fire Instructors Workshop (IFIW). The meeting then finishes with an annual conference where the community of practice can share their knowledge and experiences with their (international) colleagues. As far as known, there exists no other group concentrating on fire behaviour and education, which has a similar focus on both practical experience and scientific knowledge and has the objective to translate knowledge into practical firefighting.

At the conference in Sweden in 2018, John McDonough presented the concept of task level 'non-negotiables', detailing those he regarded as necessary for interior firefighting (McDonough 2018, McDonough 2019), while Peter McBride presented on *Rules of Engagement and Tactical Bricks* for firefighting, derived from the 'Defence Research Development Canada', funded by the 'From Knowledge To Practice' fire dynamics project. For the next IFIW meeting that would be hosted by the Fire Service Academy of IFV and CFBT-NL, it was proposed to further explore these ideas. The general opinion was, that it would be excellent if this group of SMEs formulated some basic principles for firefighting that would be the same for all fire services and could be applied globally. This idea was shared with the members of IFIW and was generally supported. This article focuses on the process and the results of the IFIW meeting in 2019 in Arnhem, which was devoted to establishing universal principles for firefighting.

Universal principal or non-negotiable?

Starting from the idea that it would be possible to determine a number of non-negotiables which could be universally used by all fire services in the world, the prospective participants were asked by email to list the statements they would like to nominate as non-negotiables and email these to the organisers of the conference. However, first a discussion via email was started about the definition of 'non-negotiable'. After having previously been interpreted as something identical to a universal principle, some participants argued that it should have a stricter, more limited meaning. The person who had introduced the term in the context of firefighting, John McDonough, had used it in a very restricted way, based on what he had experienced when returning to operations after having been an instructor for some years. He noticed that in practice, firefighters did not always do as they were taught, and consequently,

that incident commanders could never be sure how firefighters would act when being sent into a burning building. This struck him as undesirable and accordingly, he developed four task level non-negotiables in order to limit variables and ensure consistent and shared expectations. (McDonough 2018, McDonough 2019). He defined a non-negotiable as: “Agreed upon default actions, that must be employed in order to ensure shared expectations”. In his opinion therefore, a non-negotiable is literally ‘not negotiable’ and must always be employed. Accepting this strict definition, the next question was if there were any principles that did not meet this definition but could still be accepted as universal principles. During the discussion two other terms came up. The first was ‘Rules of engagement’, (McBride, 2018a, McBride 2018b) which: “provide authorisation for and/ or limits on, the employments of certain specific capabilities. Rules of engagement do not normally dictate how a result is to be achieved but will indicate what measures may be acceptable.” The second term is ‘Rule of thumb’, which was defined as: “a principle with broad application that is not intended to be strictly accurate or reliable for every situation”. All three definitions fit in the overall term of ‘universal principle’. In table 1 an overview of the definitions is presented.

The second part of the discussion about non-negotiables and universal principles was the level at which these terms could be employed: task level, tactical level or strategic level. Some participants suggested that they could even refer to behavioural aspects, incident command issues, human factors or to decision-making under pressure. This shed a new light on the definitions mentioned above, as non-negotiables in their strict meaning seem to predominantly apply to task level activities. Tactical and strategic activities mostly need more flexibility because they are influenced by many different factors. After the discussion by email, the moderators chose to focus on task, tactical and strategic principles, thereby expressing their wish that the human factors would be discussed next time. During the selection procedure that was to take place at the meeting in Arnhem, the task would be to determine universal principles, and at the same time select the task level principles that would be non-negotiable according to the definition given by John McDonough.

Table 1: Definitions

Term	Definition
Non-negotiable	Agreed upon default actions, that must be employed in order ensure shared expectations
Rules of engagement	Provide authorisation for and/ or limits on, the employments of certain specific capabilities. Rules of engagement do not normally dictate how a results is to be achieved, but will indicate what measures may be acceptable
Rule of thumb	A principle with broad application that is not intended to be strictly accurate or reliable for every situation
Universal principle	A basic principle in firefighting on any level of application, strategic, tactical, task, behavioural, incident command, which would be applicable all over the world

1 Methodology

1.1 Prelude: collecting possible principles by email

As mentioned above, the process of selection of non-negotiables had already started before the actual meeting in Arnhem, as all participants were invited to email their ideas of what could be a non-negotiable for firefighting.
In total, a number of 58 proposals for universal principles were collected. In order to be able to limit the discussion that was planned later, we decided to reduce this number to a maximum of 22. We therefore put aside (hopefully not for ever, but at least for now) all proposals that were not specific enough or were centred on behaviour or values. An example of a suggestion that was not specific enough is: “One must have a good understanding of fire behaviour”. An example of a proposal that focused on behaviour is: “One must have an open awareness” or “Be kind to each other in order to share varying opinions freely”. The 22 statements for discussion are presented in Table 1.2 on page 8.

1.2 The meeting in Arnhem

The IFIW meeting had two objectives: the first was to define some universal principles for firefighting, and second to discuss how these universal principles can be taught to firefighters. The discussions were structured through interactive working forms in order to give every member equal access to the discussion, and every idea, thought or opinion could be heard. The list of participants is presented in Appendix 1.

Figure 1.1: Overview of the conference room with 22 brown papers of the statements

	Task Level Statements
1	Stay low
2	Use the TIC
3	Control the flowpath
4	Cool the smoke
5	Put water on fire ASAP
6	Must ventilate cold smoke
7	Never work above an uncontrolled fire.
8	A fire is secure when it is isolated and/or all flaming combustion is suppressed and compartment linings are visible
9	Keep interior doors closed and search open spaces first.
10	Interior crews must have more 400 lpm.
	Tactical Level Statements
11	If no visible victims or better information, first priority is fire attack.
12	Defend the stairwell at all cost
13	Interior search & rescue only if victims confirmed.
14	Exterior attack if fire is visible.
15	Implement RIT.
16	Control fire first, then ventilate.
17	Two in, two out' for all interior operations.
18	Implement Go/No Go criteria: use SAHF criteria as indicators
19	Connect to water supply before internal attack.
	Strategical Level Statements
20	Command and control must be based objectives
21	Must do a complete 360 size-up that includes the tactile, visual and non-visual (infra-red) cues in support of decision-making and standard radio reporting.
22	If no victims - go defensive.

Table 1.2: Statements that were being discussed

1.3 Selection of universal principles and/or non-negotiables

The objective of this part of the process was to denominate 8 out of the 22 proposals as universal principles and/ or non-negotiables. At the end of the day the participants were asked to vote in order to make a selection, but before this took place, there was plenty of time for discussion. The discussions were probably even more important than the final

outcome. All 22 statements were written down on pieces of paper that were placed on tables divided over three separate rooms. Every statement was provided with a facilitator. The facilitators were recruited from personnel and teachers from the IFV and Dutch fire services. They were not firefighters or fire instructors and had no opinion on the matter, but were selected for their skills in guiding discussions. The process consisted of four rounds of one hour each. John McDonough and Peter McBride were asked to act as moderators at the end of every day and to share the results in a presentation at the conference.

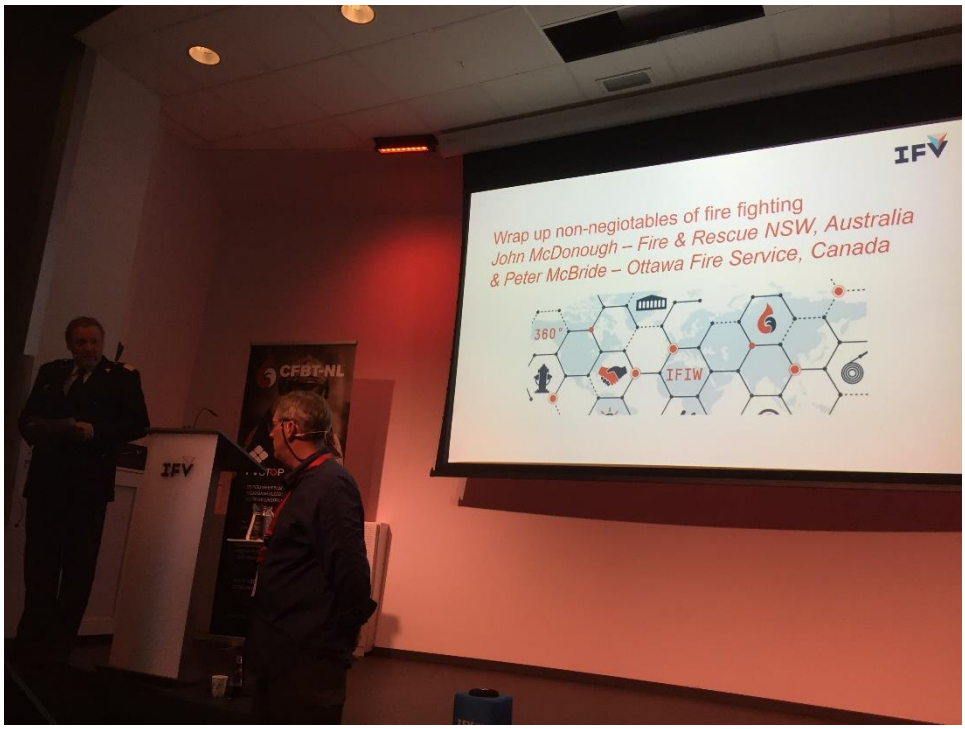

Figure 1.3: Peter McBride and John McDonough sharing the results of IFIW with the participants of the IFIC conference

The first round was held in silence. The IFIW members walked around, reading and reflecting individually on the 22 statements. Post-it notes were provided and could be used to write down thoughts (comments, questions, objections, etc.) about the statements as the participants walked around.

Round two was reserved for discussion. IFIW-members discussed with each other the statements and remarks that were made in the first round, assisted by the facilitators. During the discussion, all questions, comments and objections on the post-it notes had to be taken into account. The participants were not obliged to discuss all statements, as it was possible to only focus on the statement that they thought the most important.

Round three was meant for the last discussion: during the first thirty minutes, the discussions as described in round two were finished. In this round, the statements could be changed or adapted, based on the remarks of the participants, so as to increase the support for each statement. During the last thirty minutes, the IFIW members had to choose one of the statements and prepare a pitch for it. The facilitators took care that every statement had a pitcher; members could also work together. In the pitch, the following questions had to be addressed:

a) Is the statement a universal principle or is it a non-negotiable?
b) How can it be reformulated into one sentence that gets the most support?
c) What does the statement mean in practice? How can it be explained?
d) Why is it so important, or, in other words: why should it be a universal principle?

Round four was the pitching and selection round. In a plenary session, every statement was pitched shortly. Following the pitches, there was an election. Each IFIW-member had eight votes, to be distributed over the statements of their choice by using stickers. All eight stickers could be stuck on one statement, or alternatively, be distributed over eight separate ones. If a statement was considered to be a non-negotiable, an ‘N’ had to be written on the sticker. The eight statements with most votes were elected as universal principles and / or non-negotiables. The eight universal principles were input for the next day, when a discussion was held about how to teach these principles to firefighters. If the majority of the participants voted a principle to be a non-negotiable, it was selected as such.

Figure 1.4: Picture of the brown papers on the walls of the conference room

Figure 1.5: Picture of the brown papers on the walls of the conference room

1.4 How to teach the universal principles to the firefighters?

During the second day the main objective was to find (innovative) ways to teach firefighters how to apply the universal principles. The main question addressed was: How can we assure that the universal principles / non-negotiables become integrated into the daily work of firefighters worldwide? This discussion was held following the World Café Method.[1] Every universal principle was written down on a paper, which was put on a table that was accompanied by a facilitator. Participants were divided over the eight tables and changed table every 20 minutes in such a way, that every round a new combination of members would sit at a certain table in order to increase creativity and inspiration. The goal was to create as many ideas as possible on how to teach the specific universal principle. In this way many ideas were developed, written down and discussed. In the final round, the participants returned to the table where they had started and discussed the final result in order to prepare a short pitch. Finally, they pitched the result to the other participants.

[1] See: http://www.theworldcafe.com/key-concepts-resources/world-cafe-method/ and https://www.youtube.com/watch?v=_0d0Gybq-l0.

2 The universal principles

As stated before, not only the result of the selection was important, but also the discussion and the context (the circumstances: why, how, when) of the proposed principles, their restrictions and other relevant arguments regarding them. Actually, most of the time the context was considered the most important factor in the choice for any universal principle. Sometimes additions to the statement were proposed; it was discussed whether these would be necessary, especially when relating to skills and/or when the circumstances were obvious. The result of the selection of universal principles is presented in Table 2.1.

Table 2.1: Votes and remarks on the statements

	Proposed universal principle	VOTES		REMARK
		Universal Principle	Non-Negotiable	
1	**Put water on the fire as soon as possible**	**34**	**24**	**Non-negotiable**
2	**Do a 360 reconnaissance**	**29**	**15**	**Non-negotiable Needs elaboration**
3	**Cool the (hot) smoke**	**28**	**11**	**Non-negotiable**
4	**Implement go/no go assessment at each opening**	**28**	**16**	**Non-negotiable Needs elaboration**
5	**Identify the flow path / close all doors prior to fire control**	**27**	**17**	**Non-negotiable**
6	**Stay low**	**27**	**18**	**Non-negotiable**
7	**Command and control must be based on clearly defined strategic objectives**	**26**	**8**	**Universal principle Needs elaboration**
8	**Every crew has a TIC and knows how to use it**	**19**	**9**	**Universal principle**
9	If no visible victims or better info first prio is fire attack	16	6	Universal principle With exceptions
10	Exterior attack if fire is visible	16	1	Universal principle With exceptions
11	Defend the stairwell at all cost	15	4	Universal principle With exceptions
12	Control the fire first then ventilate	8	2	Universal principle With exceptions
13	Never work above an uncontrolled fire	2	1	Universal principle With exceptions
14	Interior crews must have more than 400 l/min	2		
15	Two in two out for all interior operations	1		

16	Interior search only if victims are confirmed	
17	Connect to water supply before interior attack	
18	Must ventilate cold smoke	
19	Keep interior doors closed and search open spaces first	Universal principle With exceptions
20	Fire is secure when it is isolated and/or flaming combustion is suppressed and compartment linings are visible	
21	Implement RIT	
22	If no victims go defensive	

In this chapter the eight selected principles as well as the context mentioned in the discussion will be described.

2.1 Put water on the fire as soon as possible – task level non-negotiable

All participants generally agreed with this statement and 24 times it was considered to be a non-negotiable. There were suggested additions to this statement which did not change the support for the statement itself but created some context. It was argued that the following conditions should be added:

a) one has to know where the fire is, and
b) the fire should be accessible.

Also, it was noted that putting water on the fire should be done from a safe location. Others thought that these remarks were so obvious, that they could be left aside. The suggestion to add the conditions that it should be effective and it should be the right amount, was considered important but ultimately redundant as all tasks should be done as effectively as possible. Most participants were of the opinion that this principle referred to all applications, i.e. from the outside or from inside. Therefore, another statement (statement 14) that focused only on exterior attacks, received fewer votes.

The World Café Method provided various suggestions as how to teach this non-negotiable, but no new innovative ideas came up. It was suggested to first explain why it should be done (e.g., in order to buy time, increase survivability, make it safer for firefighters to enter the structure). Other ideas were: hands on training, learning from the experience of others who applied it and invalidate old myths (such as: never put water on a fire from outside).

Figure 2.2: Poster of the 1st selected universal principle

2.2 Always do a 360 degrees assessment – strategic non-negotiable

This statement received 29 votes, of which 15 votes assigned it as a non-negotiable. After a discussion, it was shortened, as originally it was formulated as: “Must do complete 360 size up that includes the tactile, visual and non-visual (infra-red) cues in support of decision making and standard radio reporting”. This statement was a very interesting one, especially because of its context. Some participants disagreed with it, because they argued that it is simply not always possible to do a 360. This is true, of course, and therefore it was questioned if it should be made a universal principle. Two solutions were suggested to solve this problem:

1) if a certain action is not always possible, do not make it a rule, or
2) make it a rule but allow for exceptions.

In general, the participants were in favour of the second option: make it a universal principle which must be followed, but if that is impossible, report it. Most participants even agreed that this principle is the ‘mother of all other principles’: without a 360, some information to make decisions about strategies or tactics may be missing, and decisions have to be made, based on incomplete information. For instance, without a 360, it is hard to define the flow-paths or to effectively apply water. Interpreting the statement in this sense, it is easy to agree with it. However, it evokes questions as: What to look for? What to pay attention to? Originally, these questions were included in the statement, but most participants found it too extensive. That does not necessarily mean that they disagreed with the parts that were left out. The participants agreed that further discussion could provide more details as to what to look for specifically to make the right decisions. The tactile, visual and non-visual (infra-red) and radio report are examples of what should be evaluated and reported (and added to the training of firefighters), hence their inclusion in the original statement.

The problem what to look for was also discussed during the World Café session. In order to answer the question how to teach firefighters, or in this situation maybe the crew or incident commanders, it is important to know what they should look for and what criteria could apply. Furthermore, the question of 'why' was considered to be important. It was also argued that in probably 90% of the fires there is no problem and the fire can be put out easily without a 360, but that the 10% which deviate from the standard and need a 360 are the biggest enemy of firefighters. Accordingly, it is essential to show the importance of a 360 to the students. Some countries apply a building sector (e.g. US, Canada and Australia). It was suggested to implement such a system as a part of this non-negotiable. One of the parts left out of the original statement deals with the radio report. Some countries have a well-defined radio report procedure. It was suggested that this is also of great importance in order to inform reinforcements and the emergency centre about what is going on.

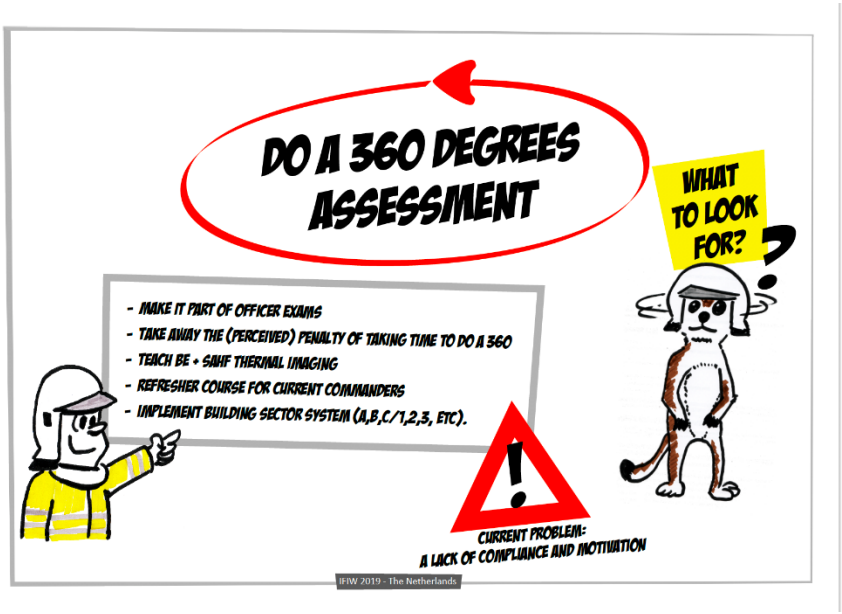

Figure 2.3: Poster of the 2nd selected universal principle

2.3 Implement go or no-go assessment at each opening – tactical non-negotiable

This statement received 28 votes and 16 times a non-negotiable vote, so it was elected as a non-negotiable. It was an attempt to provide simple criteria for a safe entry of a building. Originally, it had been extended with: "implement go-no-go criteria: 'use B-SAHF[2] criteria as indicators", but this addition was rejected. The discussion did not seem to address the SAHF criteria in themselves, but focused instead on the question what the safe/unsafe indicators would have to be. The important concept was that the Go/No-Go gave requirements for a 'Go' decision. The tactical non-negotiable is a decision-making tool used to assist company officers and incident commanders in recognizing the potential for extreme thermal conditions prior to tactical advance into or within a structure. Keeping in mind that a 'No-Go' decision on the Go/No-Go criteria does not mean 'never go'; it simply means you must mitigate these conditions prior to moving forward, bringing them in line with a 'Go' decision.

[2] B-SAHF (S. Raffel (2007). Reading the fire*, FireHouse* 12) stands for: Building, Smoke, Air track, Heat, Flames

The following was proposed (as used in Canada):

“IF the temperature is lower than 260°C, AND the neutral plane higher than 50% of the opening, AND there is no turbulence in the flow, AND there are no flames in any form visible, THEN it is safe to enter.”

The discussion concentrated more on this proposal than on the question if a go-no-go assessment would be necessary. It was even argued that it is impossible to give clear indicators for a safe entry. Every time this discussion started, it ended with the conclusion: ‘it depends’. Obviously, the next question is always: On what does it depend? In any case, if the intention were to provide absolute indicators, there would probably be too many that would influence the fire behaviour inside a building, and consequently influence the answer to the question whether it would be safe to enter. Some participants argued that the human factor should be considered. It is generally known that under time pressure people are not able take into account many indicators at the same time (up to a maximum of 3-5 is possible), which makes it impossible to come up with absolute criteria. This is most certainly a topic that deserves attention another time. One participant proposed that it should first be decided when it is NOT safe to enter a building, and then proceed from there. However, everybody agreed that although this statement is a non-negotiable, it is meaningless without further definition of the criteria. During the World Café session, this was the topic of the main discussion, because what could we teach the students if even the experts cannot provide indicators that are easy to apply? As a training method it was proposed to use movies of real fires and to train the students to recognize unsafe situations by practicing.

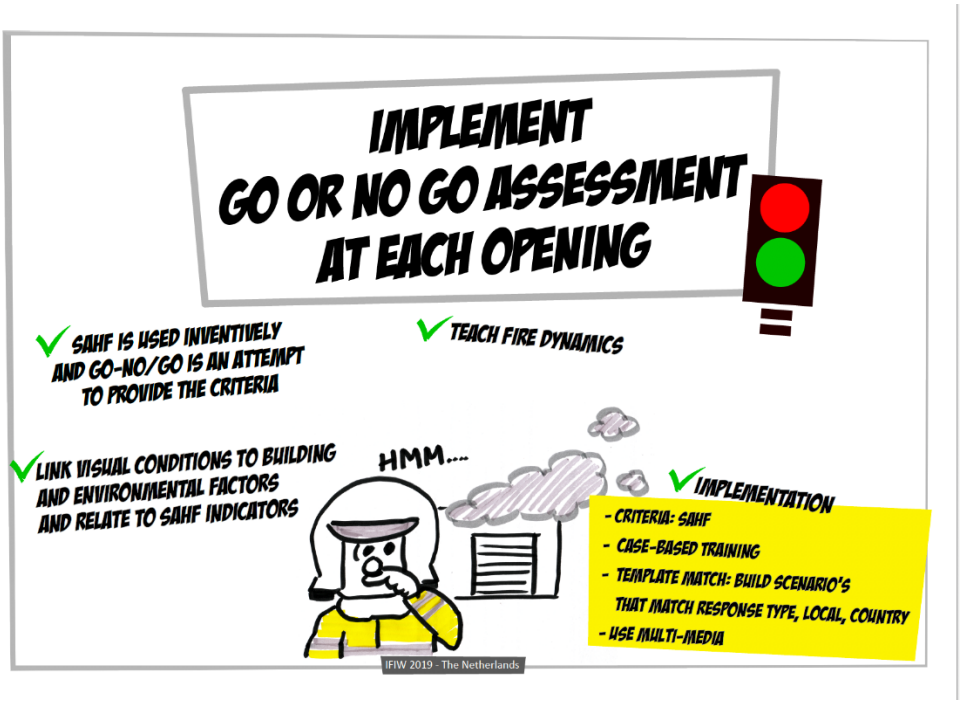

Figure 2.4: Poster of the 3rd selected universal principle

2.4 Cool the hot smoke

This statement received 28 votes of which 11 were votes to nominate it a non-negotiable, which was not enough to make it one. It is worth questioning why this statement received so much support, but why it was not considered to be a non-negotiable. A great part of the discussion was devoted to the word 'hot'. In the original statement, "cool the smoke" was not restricted to hot smoke. During the discussion some participants argued that this principle should only apply to hot smoke, because originally it was meant like that. Hot smoke should always be cooled in order to reduce radiation to the firefighters and to prevent auto-ignition of the smoke layer. There was no discussion about that, so in that restricted sense it is a non-negotiable. Discussions revolved around the following questions:

> How could we know that the smoke is hot?
> What temperature is considered 'hot'?
> Are firefighters able to determine the hotness?
> Why should we only cool hot smoke?
> What negative effect would there be to cooling cold smoke?

Is it not much easier to just cool all smoke, if it is difficult to distinguish between temperatures? Others stated that cold smoke can still ignite when in the right chemical composition and in the presence of an ignition source. Another remark made was that the statement should also determine *where* to cool the smoke, because if the hot smoke is outside the building, cooling it might be ineffective. Last but not least, the proper technique was discussed: pulse techniques and fog streams or surface cooling. Although this is an interesting subject, the technique is irrelevant to the statement "cool the smoke". Accordingly, during the discussion more and more people seemed to agree that the technique does not really matter in this respect. Both techniques can work, and it depends on the circumstances which is best. These circumstances not only refer to the efficacy but also to the training and cultural history of a fire service.

Evidently, this statement was meant to be applied especially during interior attack and facing hot smoke while progressing towards the seat of the fire. However, it applies to any situation, because no harm will be done when it is not necessary or ineffective. Had this contextual meaning been added, the statement would probably have been voted a non-negotiable. Based on all arguments, the original statement "cool the smoke" is considered to be a non-negotiable.

Regarding the training and education of principle four, there were not many innovative ideas. Training with dollhouses and videos of real fires and practicing the skills in real buildings were suggested, just as teaching the theory and educating officers. Some participants mentioned that training in containers and other simulated environments could pose an intrinsic danger to students, as they might imprint this situation in their minds as real. Instructors should therefore clearly explain the purpose of the training and stress that it is only a simulated practice scenario.

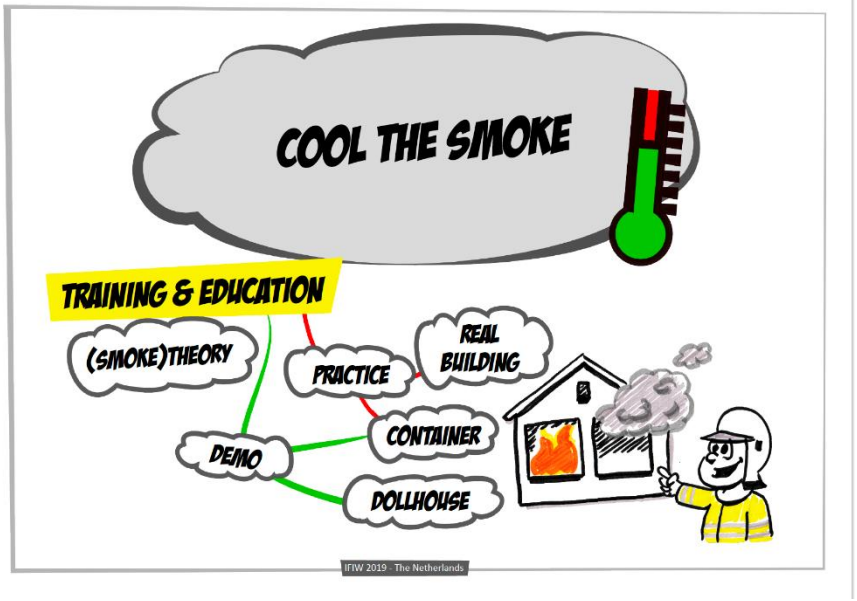

Figure 2.5: Poster of the 4th selected universal principle

2.5 Stay low – task level non-negotiable

This statement received 27 votes and 18 of these were in favour of making it a non-negotiable. During the discussion the participants generally quickly and easily agreed upon this statement. The main arguments in its favour were the following: it provides better visibility including more effective use of the TIC, less heat transfer, better stability and a higher probability of finding victim(s). The only discussion dealt with - again - the circumstances. This non-negotiable applies of course to interior attack, when proceeding to the seat of the fire. Therefore, some participants argued that it is too strict to *always* demand staying low, for instance when there is no smoke visible, when the visibility is high enough, or when the smoke is not really hot. They argued that if the distance towards the seat of the fire is considerable and the visibility is reasonably good, following this principle would not be necessary. Most participants did not disagree with this. Some proposed to add the clause 'when you cannot see your boots, stay low', while other rejected this as obvious and therefore unnecessary and voted to keep it simple.

Regarding the training and education of the principle, no new innovative ideas came up. Many instructors thought that students would do the right thing without explanation anyway. In some countries this is already routine, in some others it is not. All agreed that staying low whilst advancing a hoseline required specific techniques and on-going training.

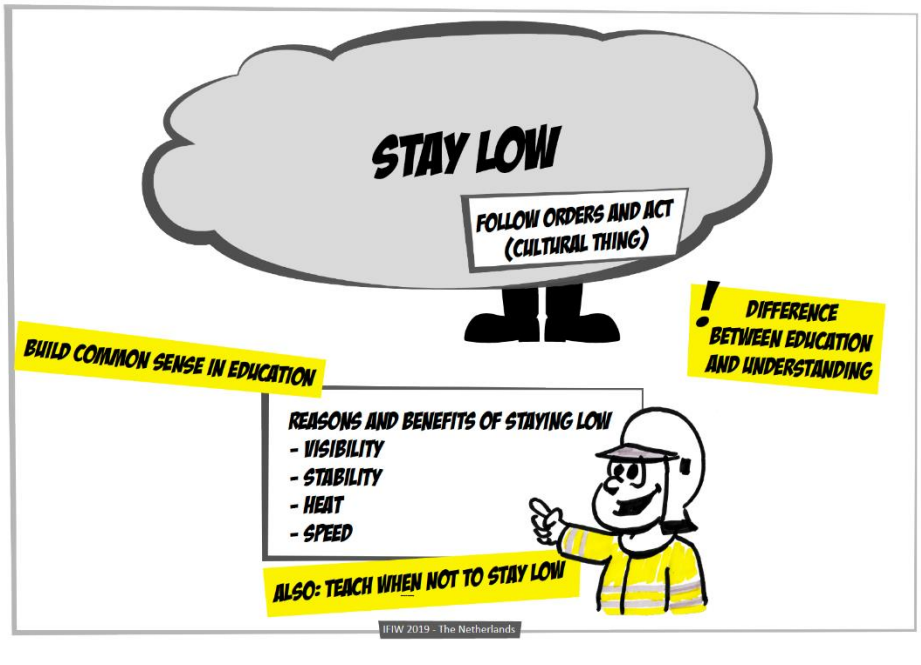

Figure 2.6: Poster of the 5th selected universal principle

2.6 Identify the flow-paths / close all openings prior to fire control – tactical level non-negotiable

This statement received 27 votes and 17 nominations for it to become a non-negotiable, though not without any discussion about the context. The original statement was: “control the flow path”. During the discussion it became clear that most of the participants had a preference to change the statement to: “identify the flow path”. It was argued that controlling the flow path would imply that it had to be identified first. This led to a discussion on how to identify flow paths, because this is not straightforward in all situations. Some participants preferred a direct approach: close all doors or apply door control instead of working with the flow paths. It needs good understanding of dynamic fire behaviour to identify a flow path. Nevertheless, in general the participants did not disagree with the statement. Therefore, the clause: ‘close all openings prior to fire control’ was added. Evidently, the first part of this statement needed more elaboration. Looking at the discussion, it can be concluded that most participants agreed with the original statement: “control the flow path” as a tactical level non-negotiable, and that it meant: restrict air and in those instances when you cannot control it, avoid being in the flow path, whether by stepping behind a door or into a room off the main flow where you can cool the smoke safely. In many cases, it is impossible to close all openings, but if you can, do so.

Regarding the training and education, it was suggested to use real fire cases as training material, small scale experiments and short video fragments to visualise it. In the training the importance of communication should be incorporated, because a team could easily open the building while another crew would be entering it from the other side.

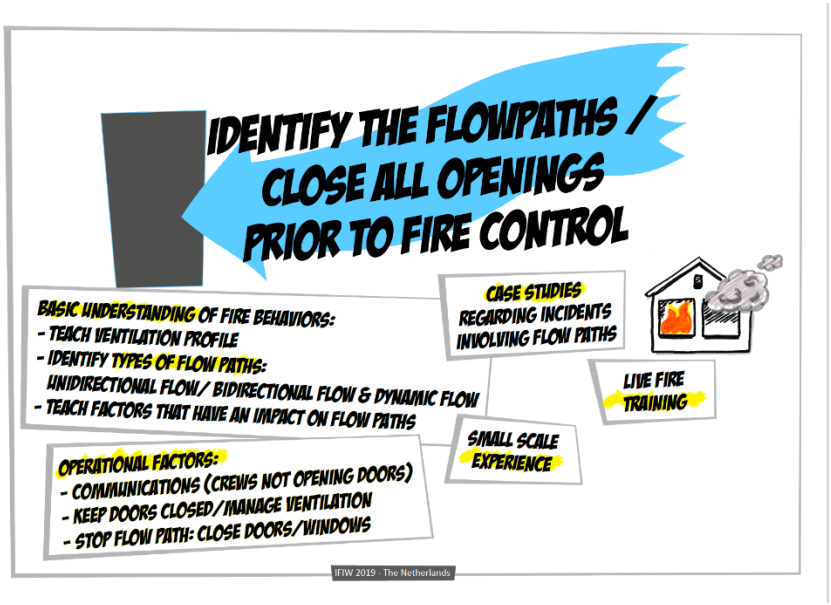

Figure 2.7: Poster of the 6th selected universal principle

2.7 Command and control principles must be based on clearly defined strategic objectives

This statement received 26 votes and 8 nominations for non-negotiable. Therefore, it was not selected as such. Most of the participants agreed about the statement and mainly discussed the question how to make it more specific. To be able to translate it into practice, it would need clear objectives and indicators to rely on. Some argued that the rules of engagement proposed by Peter McBride might fill in this gap, but there was no general understanding or agreement on that. Others argued that the human factor should be considered, and that Recognition Primed Decision Making (RPD) would prevent this from happening in reality. Still others maintained that RPD should not be the starting point of the decision-making process. Furthermore, some participants argued that 90% of the goals of firefighting are always the same: put out the fire, rescue the victims and prevent fire spread. Another interesting discussion came up regarding the terms ‘offensive’ and ‘defensive’, and the question when to go offensive and when defensive. In most Anglo-Saxon countries, the term “defensive” is used when access to the building is restricted, no one should go inside and firefighters may or may not establish a collapse zone depending on the degree of structural damage. Going offensive is almost synonymous with interior attack. In some European countries, offensive is interpreted as ‘attack the fire’, while defensive is used only for the ‘prevention of fire spread’. This difference in definitions can cause confusion.

Regarding the training and education, it was suggested to develop an international system for operational, tactical and strategic objectives and to apply the rules of engagement.

Figure 2.8: Poster of the 7th selected universal principle

2.8 Every crew has a Thermal Image Camera (TIC) and knows how to use it correctly.

This statement was awarded with 19 votes and 9 nominations for non-negotiable, and therefore was selected only as a universal principle. Strangely enough, almost everybody agreed that this statement was very important, yet it was not considered a non-negotiable. Its significance was even underlined by arguments: using a TIC is important for decision-making, for the efficacy of the attack and finding missed persons. The lack of support for making the statement a non-negotiable was caused by the following objection: many fire services would simply not be able to acquire a TIC and most certainly not one for every crew. They would have to work safely without one. Of course, people agreed that a TIC should be available for every crew, but that this is simply unaffordable. Another factor in this respect was the question: what is a crew? Is it every team on an engine, or is it every couple that enters the building? Some participants argued that the suggested addition: ‘and knows how to use it’ was so obvious it did not need to be added, or that the same could be added regarding every equipment or technique. Others though, maintained that is not obvious, as they had observed in practice that many firefighters do not really understand how to use a TIC. The application of a TIC requires knowledge about the drawbacks and possible pitfalls when interpreting the images. Altogether, most participants agreed that though the statement: “every crew has a TIC” should be a non-negotiable, it would simply be unrealistic to define it as such.

Regarding training and education, it was stressed that real smoke should be used in order to train recognition of the pitfalls. It was also suggested to record images of training and of real fires to practise with a TIC, learn about its drawbacks and interpreting the data it provides.

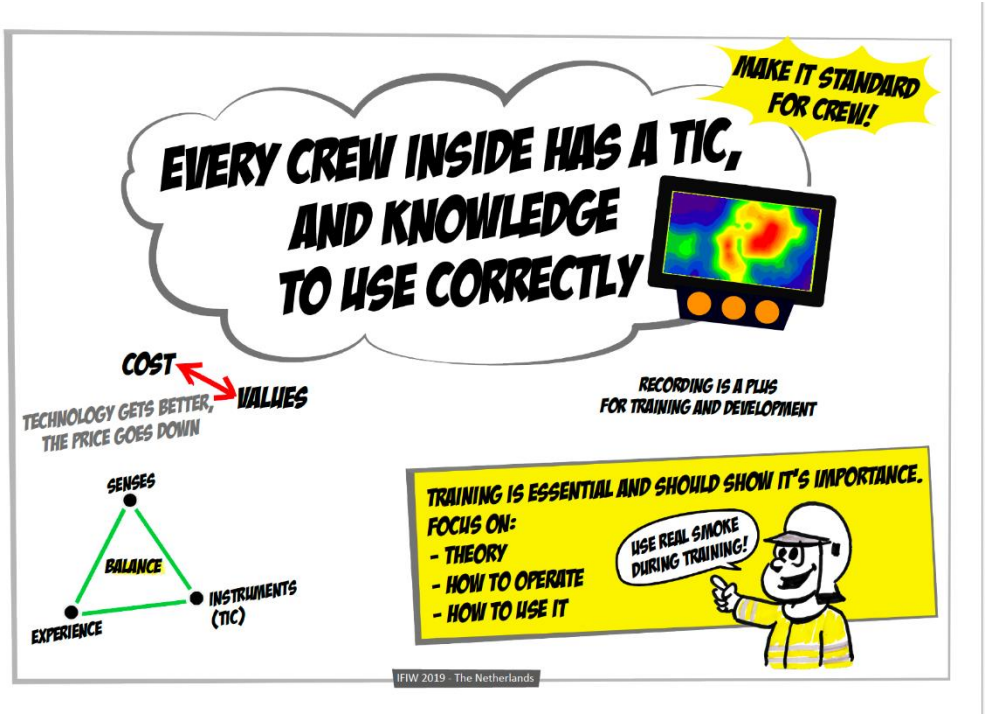

Figure 2.9: Poster of the 8th selected universal principle

3 Proposals that were not selected

Apart from the eight statements that were selected as universal principles, there were others that got several votes and therefore deserve some attention (see also Table 2.1 on page 13). These statements will be discussed in the first section of this chapter.

In addition, the statements that did not receive any votes at all are worth discussing, as it is interesting to learn the views of the participants concerning these statements. Therefore, in the second section of this chapter, these other statements will pass under review.

3.1 Statements awarded with votes

If no visible victims or better info, first priority is fire attack
This statement received sixteen votes and even six nominations for a non-negotiable. Most of the participants considered it a basic principle on task level. This statement reflects the discussion about the question what should be done first: rescuing people or putting out the fire? From the remarks and suggestions that were made during the discussion, it seemed that this statement would certainly be selected as a universal principle, because a majority of the participants agreed with it. The argument in favour of making it a universal principle was that tackling the fire first, would take away the biggest danger. The only objection that was raised against this principle was the following question: What if there are visible casualties? Therefore, the circumstances are again important. Tackling the fire is considered to be the best first action even if there is a victim reported, but it is unknown where the victim is located. Obviously, if the victim is found on the way to the fire (s)he should be rescued. In conclusion, this statement can be added to the task level universal principles. The restriction that victims encountered should be rescued can be considered a training issue.

Exterior attack if fire is visible
This statement also received sixteen votes, and one nomination for a non-negotiable. Again, the circumstances are important. Looking at the remarks made, most participants agreed with the statement, though they would have preferred to add: ‘and accessible’. This addition is a rather obvious one, as the statement probably refers to the new insight gained from UL-FSRI research that putting water from outside (exterior control or transitional attack) is possible. Of course this is only effective if the fire can be reached by the streams. The only argument brought up against this statement was that it is not possible to implement in high-rise buildings. Therefore, this statement could have been nominated as a universal principle.

Defend the stairwell at all cost
This statement received fifteen votes and even four nominations for non-negotiable. Actually, in the discussion most participants agreed that it is very important to keep the stairwell free

of smoke. The only objections against the statement that were made, either referred to the addition ‘at all costs’ or to the type of building. All participants agreed with the statement in relation to multistory buildings, and with the phrase ‘at all costs’ if there were victims reported in rooms above the fire. In conclusion, this statement could also be seen as a universal principle, albeit only for multistory buildings and when the costs balance the benefits.

Control the fire first then ventilate

This statement got the support of eight votes in favour, and two nominations for non-negotiable. In fact, most participants agreed that one should not ventilate a fire before it is under control. Some participants argued that PPV/PPA could be used. Others thought that the statement needed more explanation: When do we consider a fire to be under control? When is the fire completely extinguished? When it can be reached with a hoseline? Or when (effective) water is on the fire? Some participants argued that it is basically a good principle, but that it is not always possible to implement, for example in high-rise buildings. Others argued that this is not possible when there is a working fire, probably referring to the fact that if there is a working fire, it is already ventilated because of the opening, which is of course true. In sum, most participants thought this statement could be seen as a universal principle, but only when taking into account the fact that there are exceptions.

Never work above an uncontrolled fire

This statement received only a few votes. Most of the participants agreed that generally it is too dangerous to work above an uncontrolled fire. However, the question was what is meant by the word ‘uncontrolled’. When is a fire uncontrolled? Most participants argued that this depends on the type of building and the building construction. If the building is made of concrete and the fire cannot spread to a higher level and the stairwell is safe, the fire can easily be contained or controlled. Others said, that even in that situation the fire should be extinguished first, because there might be a spread of smoke upwards in the building. Opposing this, some argued that there might be victims above the fire and in that case it would be worth taking the risk. Some participants stated that with respect to high-rise buildings this statement does not apply, and moreover, that high-rises are so well protected there is not much danger. Some participants argued that if a fire is contained in the room where it started, it is not dangerous to go to a room above the fire. Others said that it is not always possible to know if the fire is contained, and that for safety one should assume it is not. To conclude, it seems that this statement was formulated by someone with a building in mind that is not really firesafe. Regarding a situation that involved such a building, most participants agreed that firefighters should not go above the fire, unless there are victims reported and a fast fire spread to the floor above is not expected.

Interior crews must have more than 400 litre per minute

This statement received two votes. Apparently, the statement refers to the fact that firefighters should have enough cooling capacity. Most objections against the statement related to the amount of 400 litre per minute, as participants stated that the flow rate must depend on the fire. Of course, it is true that the heat release rate of the fire must determine the flow rate. However, in practice firefighters are not always capable of assessing the heat release rate. Besides the cooling capacity of the flow also depends on the level of training and experience of the firefighter. Some participants also argued that it is not always possible to use at least 400 litres, because this amount is not always available. Probably, they were thinking about fires that are small, because if the fire really needs 400 litres per minute, going in with less water is dangerous and ineffective. To conclude, this statement was

rejected as a universal principle, possibly because it needed a more thorough discussion or more extensive explanation, as the basic idea behind it resembles that of statement one, where the addition was made that it is not only necessary to put water on the fire, but that it should also be effective.

Two in two out for all interior operations
This statement received only one vote. However, looking at the coloured stickers, there was more agreement than it seemed, based only on the votes. In some countries, it is a non-negotiable or even a law that no crew can enter a building without having at least a crew outside in case of emergency. That is probably where this statement comes from. Looking at the arguments, some participants stated that this rule provides false safety. Likely, they referred to research done in the United States, which showed that it was very difficult, if not impossible, to rescue firefighters from a warehouse when using a RIT team. Firefighters may think they can take a higher risk because there is a crew outside. Some participants were more specific and thought you should have more than two people outside to be able to do a rescue. Others were more positive and stated that it is not always necessary but depends on the situation. They were not in favour of making this a non-negotiable but thought it could be a rule of thumb. Some participants stated that following this statement is not always possible if there is a small staff on the engine. In that situation it would be necessary to wait for a second engine. Altogether, most participants thought this should not be a universal principle.

3.2 Statements not awarded with votes

Interior search only if victims are confirmed
Most participants disagreed with this statement. The idea behind it was to prevent taking the risks of doing an interior search when it is not sure that there are victims inside, for example in abandoned buildings. Some departments in the United States issue this rule for abandoned buildings: there is a victim if somebody is standing in front of the window or if somebody reports a person inside. If not, no risks should be taken in such a building. This led to an extensive discussion. Most participants were of the opinion that it should be the other way around: when in doubt, firefighters should assume that somebody is inside and start a search and rescue. Some stated that most of the time it is difficult to be certain that nobody is inside. Others maintained that there could be other motives than rescuing victims for doing an interior search, such as finding the fire and extinguishing it. Altogether, it seemed that most participants were willing to take risks for uncertain purposes, and that therefore this statement was rejected as a universal principle.

Connect to water supply before interior attack
All participants agreed that there is generally no need to connect to the water supply before an interior attack. Some argued that it depends on the situation, while others stated that there is generally enough water in the tank and that consequently, it is not a priority. However, others said that if they have enough staff available, it should be done. Some said that the flow is more important than the supply. In sum, this statement was not considered to be a universal principle.

Must ventilate cold smoke
This statement caused much discussion, and the majority of participants disagreed with it, mainly because of the fact that cold smoke, mixed with a right amount of air and in the presence of an ignition source can still ignite. Only a few participants agreed, but with the restriction that the smoke should not be in contact with the fire. The question is, if it is possible to know this. Most participants thought this was not the case. Additionally, some disagreed because they thought not only cold smoke should be ventilated. In sum, there was no support to make this statement a universal principle.

Keep interior doors closed and search open spaces first
Although this statement did not get much support in votes, no hard arguments against it were put forward, especially not against the principle of closing internal doors as often as possible. The arguments referred mostly to the order in which the statement suggests that the searching should be done. The most important objection was, that whether or not the statement is valid depends on the available information. If it is known where the victim is likely to be, then why search in open spaces first? Some participants said that it is important to first extinguish the fire. However, the statement does not exclude putting out the fire if its location is known, so this is not a real argument against it. In conclusion, there does not seem to have been much disagreement, and this statement could as well have been made a universal principle, and is also covered in statement six.

Fire is secure when it is isolated and/or flaming combustion is suppressed and compartment linings are visible
Nobody agreed with this statement, as some participants had a very strict opinion: a fire under control is a fire that is extinguished. Others stated that in the situation described by the statement gases that can ignite can still be released or the smoke can be gathered in hidden spaces or in the construction of the building where it can ignite. Some had an even more rigorous view: there is no such thing as a safe fire. Based on the discussion, it seemed that a new statement had been formulated that could become a universal principle: “A fire is secure when it is extinguished and the smoke is ventilated even from hidden spaces”. However, this proposed new statement was rejected.

Implement RIT
This statement has some resemblance with statement fifteen. Most participants disagreed with the view to make implementing the RIT a universal principle. The first argument was that it provides a false safety, and that there are better ways to organize firefighter safety. Some stated that it might be useful in large structures, while others disagreed with that, based on research done in the United States. Others state that it is a part of the Incident Action Plan to keep resources dedicated to firefighter down events.
Eight participants stated that it should only be done if there is a large enough crew present. This is a rather strange argument, as it suggests that firefighter safety depends on the availability of staff. Altogether, according to the participants this statement is not considered a universal principle nor a non-negotiable; it certainly needs more elaboration.

If no victims, go defensive
Most participants disagreed with this statement that shows some resemblance with statement sixteen. Some argued that one can never be sure if there is nobody inside, and therefore always need to go offensive. Bear in mind that the term ‘defensive’ in the Anglo-Saxon countries is interpreted as ‘stay outside’ and offensive is mostly referring to internal

attack,. which means that taking risks is allowed to save lives and property and to prevent damage to the environment. In other countries, the risks taken should balance the benefits. Offensive then means ‘attack the fire’. Most participants are willing to go offensive if there is no victim inside, because saving property is also an important objective, although this may vary per country. In some countries firefighters are not allowed to take any risks with the aim of saving property, but apparently in most other countries they are allowed to do so. Some participants argued that it depends on the risks and the building construction whether they would go offensive. Altogether the statement was not agreed upon and cannot be considered a universal principle.

4 Conclusion and discussion

4.1 Conclusion

During the 11th annual meeting of the International Fire Instructors Workshop in Arnhem, the Netherlands, around 30 people participated, all experts on fire behaviour, firefighting and fire instruction. The aim of the meeting was to select basic principles of firefighting that apply all over the world, as well as to discuss how these principles could be taught to firefighters. In order to facilitate the discussions, an interactive approach was used and facilitators were employed to guide the discussions. All participants were enthusiastic about this methodology, as there was plenty of opportunity to exchange arguments, adapt the statements and share knowledge and experiences. The discussion focussed on 22 statements which were pre-selected out of the 58 original statements that were proposed by the members. At the end of the process eight universal principles and six non-negotiables were selected.

One of the most important conclusions of the discussion was, that every statement had to be seen in its own context. By taking the circumstances into account, it is possible to fully assess the value of the universal principles and non-negotiables. Therefore, in this report the arguments pro and contra have both been described, because they provide the statements and discussion with context. Although the principles themselves can hardly be disagreed upon, some of the universal principles / non-negotiables need more elaboration, because a discussion can be held about their underlying basis. Other principles do not need elaboration but carry certain restrictions or exceptions in them. It has been proposed that a mind-map could be helpful in showing the links between the universal principles along with lesson plans with suggested readings, and that in a next meeting the principles that need to be elaborated on will be discussed further.

4.2 Discussion

In this report the results are reported of a discussion between various experts from all over the world, enabled by using interactive working forms. All participants were enthusiastic about the interactive approach and agreed that this could be used in the future to elaborate on the principles that they had selected during the meeting. The discussions about the reasons for selecting or rephrasing statements were possibly more important than the final outcome, that consisted of six non-negotiables and eight universal principles.

These principles can be used as a basis for discussions in various fire services or even as a support for implementing new regulations. International support for the principles can be of great help to individual fire instructors, make firefighting safer for firefighters and facilitate the sharing knowledge and experiences. The selected universal principles and non-negotiables support the original proposal made by McDonough (McDonough 2018) and also those basic principles incorporated in the *Renewed View on Firefighting* as developed in the Netherlands

(Fire Service Academy 2018) and the *From Knowledge To Practice* fire dynamics curriculum (Ottawa Fire Services 2018).

Some of the principles carry certain specified restrictions or exceptions with them, while others need more elaboration. The participants argued that the implementation of these principles depends on the history, culture and capabilities of the fire services in the participating countries. The circumstances turned also out to be a very important factor in interpreting the right objective of every universal principle.

During the discussions and the wrap ups, it was noted that the universal principles and the non-negotiables were linked to each other in certain ways. It was suggested that a mind map would be helpful in showing these links. For example, the different levels of employment could be connected, as well as the order in which the principles could be followed. This is considered to be a subject for further elaboration by the IFIW group.

Although the universal principles and non-negotiables are the result of a discussion between experts on the subject of fire behaviour and firefighting, they would gain a stronger base if they were validated and supported by scientific experiments or case studies, which is presently the case in only a few occasions.

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Appendix 1 List of Participants

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Tsz-leung Choi	Hong Kong
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Maurice Grumeau	Belgium
Ed Hartin	US
Stuart Helmore	Australia
Edward Huizer	The Netherlands
Steve Kerber	US
Peter Krom	The Netherlands
Katherine Lamb	UK
Karel Lambert	Belgium
Yeah Yung Lang	South Korea
Peter McBride	Canada
John McDonough	Australia
Hans Nieling	The Netherlands
Ilona Olthuis	The Netherlands
Kimon Pantelides	Greece
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Appendix 2 List of Moderators

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