**Human Factors, Weak Signals and Communication**

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| Reminders of this module's objectives:  At the end of the module, participants:   * Will understand that the human factor, as regards safety, is characterized by:   + Risk perception   + Risk assessment   + Risk taking * Will understand what the weak signals are. * Will understand the importance of interpersonal communication in risk management (including taking cultural differences into account) * Will be able to practice active listening. |

This document is the trainer guide. You can follow it because it contains all of the elements that will enable you to lead such a module, namely the instructions for exercises, accompanying Powerpoint references and/or various resources such as films, e-learning, etc., the questions to ask participants, the exercises to be completed if necessary.

**Note: There is a slide to be filled out locally (slide 35) if necessary, to show the local specificities (culture) of communication that non-native participants should know (especially if they influence safety: how to pass on instructions, gestures to avoid, etc.)**

**Estimated duration: 4 hours 15 minutes**

**Teaching methods:** Presentation in the classroom and exercises.

**Prerequisites:** TCG and TCAS

Important points for preparing the sequence:

The videos that you will need to teach this module, in order of appearance:

- Apollo

- Qantas 32

- Selective attention test

- Man\_crossing\_railway

- Last 4 minutes of flight AF447

**Welcome the participants:**

Welcome.

Before beginning, let's look together at the objectives of this module and how it is rolled out.

**Show slide 2.**

**Ensure that the contents are clear to everyone.**

**Answer any potential questions.**

**5 minutes** **00:05**

**Sequence 1:**

***The aim of the sequence:***

*To understand that the human factor, as regards safety, is characterized by:*

*- Risk perception*

*- Risk assessment*

*- Risk taking*

*To understand what the weak signals are*

To begin, we will look at two videos, one which characterizes the human factor as a weak link and the other as a strong link with regards to safety.

Let's start by looking at this report on a catastrophe that took place in the 1960s in the United States during the space era, the Apollo 1 catastrophe.

**Show the "Apollo" video - 6 minutes 30 seconds (slide 4 is just an image, the video is in the module file).**

**Then ask:**

* What do you think is the source of this catastrophe? How did you arrive at this conclusion?
* Were the risks correctly assessed? Why?
* What pushed them to take so many risks?
* How would you rate the perception of risk in this case?

**Summarize the answers, which could be:**

*“The risks were not correctly assessed, in a project mode where everything moves fast, the pressure, the stress, the schedule objectives pushed them into deadlock. In this case, no one had taken the time to assess that by pressurizing to 100% oxygen, the capsule exposed the pilots to maximum risk! Here, human beings were the weak link in safety"*

**15 minutes** **00:20**

Now, let's look at a counter-example, the video about managing serious damage aboard Qantas flight 32.

**Show the "Qantas 32" video - 2 minutes (slide 5 is just an image, the video is in the module file).**

**Then ask:**

* How would you summarize how the accident was avoided in this example?
* What can you learn from it as an example of human action?

**Summarize the answers, which could be:**

*“By dealing with the situation calmly and coolly, working in teams and following procedures, humans are capable of handling high-risk situations.”*

**15 minutes** **00:35**

**What characterizes the human factor.**

Now let us look at what the human factor is in risk perception. You already know the “Swiss cheese model”: the human factor is the last barrier.

**Show slide 6, emphasizing that even if the human factor is the last barrier, its actions have a significant effect on the other two.**

The human factor is characterized by:

* Risk perception (signals and judgment)
* Risk assessment
* Risk taking

**Show slide 7.**

It is on these three points that we will concentrate in the first part of the training, and then we will talk about communication, which is an essential aspect in managing high-risk situations.

**5 minutes** **00:40**

**Risk perception**

Risk perception is one of the essential aspects of the human factor when it comes to safety. Our senses are sometimes lacking (due to familiarity, distraction, saturation or stress) and the image we possess of reality may be false.

**Show slides 9, 10 and 11.**

Our senses can be altered by a set of interferences, the most common being:

* Familiarity: we become accustomed to a risky situation when it recurs time and again. It ends up becoming normal and we no longer pay attention to it.
* Distraction: for example, when we do not pay attention to what we are doing because we are distracted by an event taking place near us (hammer blow to the finger). Or conversely when we are so focused on a task that it prevents us from seeing what is around us.
* Saturation: when there is too much information to process and our brain is no longer able to keep up.
* Stress: creates a physiological reaction that tends to lock us into our feelings and makes us sensitive to our surroundings.

Let's take an example: I will show you a short video and you will tell me how many times the players in white make a pass in this film.

**10 minutes** **00:50**

**Show the video on slide 12: "Selective attention test". Note: stop it at 45 seconds, then ask:**

So, how many times did they make a pass?

**Let the participants discuss for 2 minutes then ask:**

And did you see something odd?

**Let them answer to see whether anybody saw the gorilla.**

**The idea is to show them that you can be easily distracted by a certain aspect (in this case, the exercise instructions).**

**Then go back through the film to show them the gorilla moving through.**

**Establish the link with risk perception and weak signals.**

**10 minutes** **01:00**

**Weak signals**

Weak signals and identifying them is one of the main difficulties in the way in which the human being perceives things (as explained above), because they are essentially difficult to identify simply and directly.

Let us look at the definition together:

**Show slide 14**

A weak signal is therefore something you see but do not perceive directly as having potential consequences.

You have surely said to yourself after something big has happened: “I noticed something but at the time, I didn't react to it!”. You have perceived a weak signal but did not analyze it: it was not taken into account in the action that followed.

Weak signals are easier to detect when we are not involved (during visits, audits, etc.), but the challenge is to identify them in our own activities: concentration on a task to be accomplished, fatigue, stress ... are all factors that prevent us from analyzing the situation correctly.

**You yourself may even be the weak signal!**

Let us look at some examples of weak signals:

**Show slide 15**

Do you see other examples of weak signals?

**Let participants answer, thank the first volunteer and write the examples on the board.**

How do you think it is possible to identify weak signals?

**Accept answers and summarize:**

To be able to identify them, the existing tools, when you are not involved: site visits, tours, audits, etc.

When you are involved: they mostly involve helping human beings to get a better overall view, to factually analyze the situation and to imagine the potential risks, working in teams through meetings or open discussions (work permit meetings, Tool Box Talks, Safety Talks, etc).

**20 minutes** **01:20**

**Risk assessment and misrepresentation.**

Our risk assessment can be altered by a misrepresentation of reality, for many reasons already mentioned: familiarity, distraction, saturation, stress, etc.

As an example, I will tell you a true story: the disappearance of a squadron in the Bermuda Triangle.

**Show slide 17**

During an Atlantic flyover exercise, the squadron was surprised when they could not find the island they should have flown over. The radio conversations went something like this:

*"We are a little lost; tell us what to do.*

*- You are east of Florida; head west, you will fly over land and along the coast to Miami.*

*- We do not have much gasoline and, what's more, I can no longer find west, my instruments are skewed.*

*- Sir!* *Mine work; you just have to follow me. It's this way!*

*- No, not that way!* *You are mistaken, it's the other way!*

*- But sir, my instruments ...*

*- Do not argue, I'm the commanding officer, follow me!"*

The squadron disappeared, followed by various interpretations of extraordinary phenomena, the Bermuda Triangle, etc.

So, in your opinion, what is the problem here, what mistake did the squadron make?

**Let the participants answer and discuss for 5 minutes then give the facts:**

By analyzing what we have been able to find out about actual positions and trajectories, the conclusion considered to be the real cause of the accident was the spatial disorientation of the squadron commander.

The squadron commander had constructed an incorrect representation of reality. He thought he was on the other side of Florida and so he could not process the information that was given to him, it was all filtered and interpreted.

He was told to head west to reach the coast, but his spatial disorientation had reinforced in his brain the idea that he was flying over the Gulf of Mexico. Had this been true, setting a course to the west would have taken them away from the coast.

**Show slide 18 (map of Florida, which shows the position assumed by the captain when clicked, then the actual position on the 2nd click).**

He therefore questioned his instruments, as he said, and it was easier to imagine that they were at fault.

In the end, this mistake led to the loss of the squadron.

**10 minutes** **01:30**

Of course, misrepresentation is not the only risk assessment error.

**Show slide 19**

**Answer any questions, and cite examples, such as:**

**Representativeness**:*Joe used this shortcut to get back to camp, nothing happened to him****!***

**Availability:** *My car has broken down. My colleague, who has the same model as me, had a starter problem, so I have a starter problem.*

**Reinforcement:** *I bought these shoes at 50% off, it was a bargain, they were €300!*

These shortcuts, which we create innately and through experience, are useful for some of the actions we take. These are reflexes that allow us to solve simple problems in everyday life quickly. But for complex situations they are sources of error, especially when the situation should be assessed (to gather the facts).

**Risk taking**

Let's now talk about the third point in the human factor, risk taking.

Let us start by watching a short video.

**Show the video on slide 21: "Man crossing a railway" - 20 seconds**

**Then ask:**

Why do you think the first man crosses when the barriers are closed?

And the second?

What can you conclude from this case, on the risk assessment and risk taking by each individual?

**Let participants answer and summarize.**

We have seen that our perception of risk is often altered by mental shortcuts or blurred by factors that disrupt us, but risk-taking is also guided by the search for immediate, certain and positive consequences.

Direct consequences are found in the way in which we take chances.

For example, let's go back to the two men who cross the railway, and look at what triggers their behavior, then the certain, immediate and positive consequences that make them adopt this behavior.

**Show slide 22. Imagine the triggers (they appear by clicking), then first ask about the obvious negative consequences then the certain immediate and positive consequences that push them to still adopt this behavior (they also appear by clicking).**

**You can take another simple example like “smoking a cigarette”.**

As we have just seen, certain, immediate and positive consequences strongly guide our actions. Do you think there are other factors that push us to take risks?

**Note the answers on the board and show slide 23, to check the similarity of participants' answers with those on the slide.**

**Focus on the social recognition of risk-taking by asking participants if examples come to mind (e.g. extreme, combat or contact sports, some of which are very dangerous (base jumping, Thai boxing, etc.).**

**20 minutes** **01:50**

**Exercise on aspects of risk taking.**

Let's do an exercise. I will show you 3 photographs and in pairs, you will look for the expected consequences that push individuals to take chances.

**Show slides 24, 25 and 26, leaving 2 to 3 minutes per slide so that the participants can discuss and note down the immediate, certain and positive consequences expected for each situation.**

**Then refocus on situation 1 and ask them before starting to cite the expected consequences:**

What risks have you assessed?

**Then:**

What immediate and positive consequences can you think of for each character?

**Thank the volunteers and ask the other participants to clarify them. Do the same for the other 2 photographs.**

**In summary:**

What's interesting to note, for each situation (especially the last one), is that people do not perceive the same risks and immediate, certain and positive consequences. Risk-taking is therefore very personal, even though peer pressure and social pressure plays an important role.

**20 minutes** **02:10**

**Break**

**15 minutes** **02:25**

**What about you?**

Take 10 minutes to individually answer the 3 questions on the next slide.

**Show slide 27**

**Leave 10 minutes for them to note down the answers.**

**Then ask:**

Who wants to tell us about a situation where they took a risk that they later regretted?

**Thank the volunteer and ask what actions they think they should put in place to not end up in this kind of situation again?**

**Ask the others if they have any additional solutions to offer the volunteer.**

**15 minutes** **02:40**

**The crucial role of communication.**

We will now talk about communication. As we have already seen in the example with the story of the Bermuda Triangle squadron, communicating correctly and relying on others may be key to realistically perceiving risks.

Let's look at another example, a tragedy: the crash of the Rio - Paris flight that fell into the waters of the Atlantic. A reconstruction of the last minutes in the cockpit of the aircraft was carried out. Note the communication issues.

**Show the film on slide 29 "The last 4 minutes of flight AF447" – 7 minutes**

So, what are the main communication problems you identified in this video?

*NB: Participants should cite examples such as: misunderstanding of the difference between "Pull up!" (order) and "Pull up?" (question).*

**To summarize, show slide 30**

In the example of flight AF447, we can see that the environment (the situation, including the absence of the captain at the beginning and warning messages, etc.) plays an important role in understanding the person you are communicating with. In this case as well, it has an effect not only on the message transmitted but also on the receiver's response.

Moreover, in communication, it is not only what is said that counts, but also how it is said: this is metacommunication.

**Show slide 31**

Metacommunication helps to support the message that you want to pass on. For it to be effective, you must ensure that the person you are communicating with can see you. This is one of the reasons why, for important messages, it is always best to communicate face to face rather than by email or phone.

**Ensure everything is correctly understood and answer any questions.**

**20 minutes** **03:00**

To better understand communication, especially in risky situations, we will look at 2 simple keys that can be grouped as "active listening". These 2 techniques will help ensure that you have understood what you are told and to gather as many facts as possible, which as we have seen, is essential in controlling risks on a daily basis and especially in difficult situations.

First, what can you tell us about active listening?

**Let a volunteer answer then show slide 32.**

* **Listen:** really focus, it's not a gesture, it's a necessity**.**
* **Rephrase:** to ensure that you and the others have listened and understood **(there is no wrong way to rephrase; even if it is incorrect, the others will be able to clarify).**

**Then show slide 33.**

* **Make it clear:** to clarify unclear or incomplete points, for example:
  + “everyone says that” 🡪Who, precisely?
  + “a lot” 🡪How much, precisely?
  + “over there” 🡪Where, precisely?
  + etc.

**Workshop on rephrasing/clarifying.**

Let's play a game to practice active listening: everyone will alternately be a transmitter or receiver.

**To do this, organize a very simple exercise where, in pairs, one person tells a quick story and the other listens actively, then reformulates the key points of the story and passes it on.**

**If necessary, the story can be clarified using "please clarify" questions.**

**To establish the link with metacommunication, at each rephrasing, ask if the recipient can clarify the feelings they have seen or felt through the intonation or attitude of the transmitter.**

**The person who told the story then says if the rephrasing is correct, if it has been correctly understood and if the feelings analyzed by the receiver are correct.**

**Do it as many times as necessary so that everyone is a transmitter and receiver once.**

**If there are only one or two participants, take part in the exercise yourself.**

**N.B. for the trainer**: Although those who are telling the story know that this is part of an exercise, they will naturally outline certain points in their story if rephrasing shows that they have not been precise enough.

**Thank and praise the participants.**

**Then ask:**

Can you see the situations in which you will be able to use these 2 active listening techniques?

**Let participants discuss the question for 5 minutes.**

**25 minutes** **03:25**

**Foreign language communication.**

For the last step in this module, we will talk about communication in a language which is not our own. Before we start, we will relax a bit in front of a short advertisement.

**Show the video on slide 34 "Berlitz junior" - 35 seconds.**

Then, quickly, what is the problem here?

**Give participants 2 - 3 minutes to answer.**

**Then establish the link with the next slide**

**5 minutes** **03:30**

Here are 10 tips to improve foreign language communication.

**Show slide 35.**

**5 minutes** **03:35**

The language barrier is of course involved when it comes to communication, but sometimes there are also difficulties in understanding that are related to cultural differences.

**Show slide 36 with your local contents**

**Then show slide 37 on how to improve inter-cultural communication.**

**10 minutes** **03:45**

**To summarize**

To summarize this module, I would like you to answer the following 3 questions:

**Show slide 38 and leave 10 minutes for participants to answer it.**

**Then organize a round table discussion on everyone's answers and ask whether the contents of this module have raised new questions. If this is the case and you do not have the answer, direct the participant to the person who will be able to provide an answer or say that you are going to inquire (and provide a quick response a few days after the session, at the latest)**

**Thank and praise the participants then conclude the module.**

**30 minutes** **04:15**