Podcast 010 – EBT

Hello and welcome back to another edition of the Boeing 737 Talk. Today Ian and I will be discussing the move to Evidence Based training or EBT. In 2007, due to the progress in the design and reliability of modern aircraft, a rapidly changing operational environment and a lack of addressing the issue of Human Factors, a strategic review of airline pilot training was asked for by the IATA Training and Qualification Initiative.

The international working group put in place comprised of Civil Aviation Authorities, academic institutions, aircraft original equipment manufacturers, international organisations, pilot representative bodies and training organisations. This is where Evidence based training was born.

The first edition of the "Manual of Evidence-based Training" was released in May 2013 and was jointly agreed by ICAO, IATA and IFALPA. We'll put a link to doc 9995, as well as the implementation guide on our website www.B737talk.com for those who want to delve deeper. Since the underpinning data guides EBT there will be systematic reviews and changes to ensure its' continued accuracy.

A nice introduction to today's topic and one that we've all been seeing creeping in since its inception when we've doing our 6 monthly or some, now yearly sims.

EBT was born out of a need to evolve our training along with the aircrafts themselves as well as reacting to new research into Human factors or the way we react and operate in these new styles of environment. The move is away from event-based training and over to an evidence base approach.

EBT gets its' source data from multiple locations and includes LOSA reports, Flight Data Analysis Studies, Accident or Incident Analyses and Pilot survey to name a few. An interesting outtake from LOSA or Line Operations Safety Audit to give it its full name was that 4% of all approaches were unstable. Of these approaches 97% continued to land 10% of which resulted in abnormal landings. When a GA did occur, it was almost always poorly performed, usually as it was a surprise to the crew and rarely occurred at the briefed missed approach height.

After analysing these data sources important differences emerged leading to the classification of 4 different jet aircraft generations. The 737NG is considered 3rd generation with the Max in the latest 4th generation group. Results from the analysis indicated that while there remained overlap in risks and training among the generations, there were also quite distinct differences in patterns of risk that were not being addressed. Certain critical core pilot competencies emerged in technical and non-technical areas illustrating the need for changes in focus to airline pilot training.

We needed a new way to not only be able to deal with foreseeable problems, we're pretty good with those, but to be able to use the same tools to deal with the unforeseeable issues.

In today's aviation world system complexity and high reliability mean that the next accident may be something completely unexpected.

Here was born the competencies model we're coming to know and of course love. Each airline will have come up with a variation on this theme so please adhere to your own operators list but here we'll look at the original 8 core competencies.

First up is Application of Procedures. This is described as identifying and applying procedures in accordance with published operating instructions and applicable regulations, using the appropriate knowledge.

Next is Communication. The trainee should demonstrate effective oral, non-verbal and written communications, in normal and non-normal situations

The next two are Aircraft Flight Path Management. Firstly, in automation where the pilot will use appropriate flight management systems and guidance through the automatics and Secondly in manual control where the flight path is controlled through manual flight using appropriate flight management and guidance systems.

Number 5 is leadership and teamwork where the candidate will look to demonstrate effective use of both.

Next, problem solving and decision making, described as accurately identifying risks and resolving problems. Uses an appropriate decision-making model.

7 is Situational Awareness. We should perceive and comprehend all relevant information available and anticipate what could happen next that may affect the operation.

Finally, we have workload Management which involves managing available resources efficiently to prioritise and perform tasks in a timely manner under all circumstances.

Each competency comes with a set of behavioural indicators which allows both the trainer and trainee to look at the parameters on which their performance of these competencies is based upon. We won't read all those out as each of your airlines will have its' own, but I would suggest giving them a good read through as if you understand what is expected of you you are more than likely going to deliver it. using these competencies effectively gives you a very good framework to resolve both the foreseeable and unforeseeable problems you may come across in the simulator and onboard the jet.

We still have our Mandatory Training items including but not limited to our EFATO's, Rejects, 2D approach to MDA and 3D single engine approach with a GA at DA. But we now also have our EBT element where airlines can either choose a baseline EBT with off the shelf solutions with no analysis or design work by the operator or they can choose the Enhanced EBT which are developed by the operator according to the principles in the EBT manual but involve Data collection, Aircraft type analysis, Risk and training analysis and programme definition.

Some examples from the baseline EBT programme include Adverse weather, Go-around management, manual aircraft control, unstable approach, surprise, workload, distraction,

pressure, loss of communications, pilot incapacitation and upset recovery training to name just a few!

As an example of recurrent training under EBT you may get three phases. An Evaluation phase that will assess competence, Identify Training needs and validate training system performance. This would normally be conducted as line orientated with one or more occurrence with an assessment of the competency elements.

Phase 2 could be a Manoeuvres Training phase which will train manoeuvring skills to proficiency and validate system performance and skill decay. This would be conducted through a series of deliberate actions to achieve a prescribed flight path for example your EFATO or OEI GA.

The 3rd phase would be a scenario-based training phase where the objective would be to manage the critical threats according to the evidence. As trainers we would look to improve competency use to manage foreseen and unforeseen threats. This again, would be line orientated with one or more predictable or unpredictable threats.

To facilitate this new style of training it is of course important for us to evolve as trainers too. As pilots we are always looking for ways to improve our performance and it is no different as instructors. Feedback from training sessions is vital so we can look to adjust where necessary or change if so needed. Feedback is something the training community really values so please don't hesitate to be honest with it after your training or checks.

Facilitation is another aviation buzz word at the moment. I believe this time though it's for very good reason. The discussions we can have from professional to professional grows everyone's knowledge and no matter what the experience in the room everybody will go away having learned something, and that certainly includes the instructor. Allowing people to gain insight and self analysis will improve performance at a far greater rate than the old style of direct technique. That is not to say that direct instructing doesn't still have its place of course. It is much better to come to the reason for any problems yourself as you may well be the one with the answer anyway, so the instructor is there to help us come to that conclusion.

Instructor qualities that this EBT system requires to work correctly include patience, humility, honesty, empathy, being both supportive and respectful, and of course knowledgeable. Now who has ever met an instructor lacking in any of those. All I can say is it's good that this podcast is only one way! All instructors have obviously been in the candidates' shoes so our aim is to create as comfortable an environment conducive to positive learning as possible although we know we can't settle all nerves, but we will at least try.

EBT allows instructors to use scenario-based events to assess crew competencies and focus on root causes of any unsuccessfully flown manoeuvres. This allows for the correction of inappropriate actions rather than simply asking for a repeat with no real understanding of why it went wrong the first time.

In summary, a key buzz word in aviation today is resilience. What does this mean? Well by the dictionary it is the capacity to recover quickly from difficulties, OR the one I like states the ability of a substance or object to spring back into shape. We all know the initial feeling when something goes wrong in the sim and I'd say it certainly starts by putting me out of shape. EBT looks to give us the tools through enhancing our competencies using correct training to reshape ourselves more efficiently under any given stress. We as humans cannot completely rid ourselves of the shock factor, but we can certainly arm ourselves with ways of reducing its effect and maybe even the length of time it grips us.

As we're ticking off buzz words today let's look at another product of EBT, Threat and Error Management. This is something that we all have no doubt been doing over the years but now it has its own categorisation. TEM as we call it due to our inability to resist three letter acronyms uses the practical integration of Human Factors knowledge into the operation. We recognise that as humans there are certain situations and times where risks are increased and due to our capacity at these times being tested, we need to use mitigation techniques to keep that individual and crew capacity where it needs to be. TEM is now embedded in Flight crew licensing requirements and through briefs and even just conversations with crew and operational staff is embedded too in the way we operate safely on a daily basis.

There are three components to TEM. Threats, Errors and Undesired Aircraft states. It's set up like this as both threats and errors are part of everyday operations that must be managed by flight crews, since they both carry the potential to lead to an undesired aircraft state. Flight crews also have to manage these undesired states which have potential for unsafe outcomes. The management of undesired states is vital as the last defence to maintain safety margins.

Just to contextualise some of the threats we see when we operate here a few examples, but the list is potentially a lot longer than this! Paperwork errors, Adverse weather, high ground, congested airspace, errors by people outside the flight deck such as ATC, crew or engineers and at the moment let's not forget a lack of recency and again that doesn't just apply to the flight deck but to those around us too. Be vigilant.

We can brief against these known threats as a crew and come up with ways to stop them leading us into an error or undesired situation. This highlights the importance of making the brief interactive as your crew member may have seen a threat you don't or may have another, better way to mitigate against it. If you both know how you will deal with a threat, then there won't be a surprise when you perhaps action it on the controls. This also allows your PM to actively monitor you at these critical times.

Not all threats are obvious to us and can include things such as equipment design, optical illusions or shortened turn around schedules. These are known as latent threats and really test our abilities to use those developed competencies to mitigate against them.

Errors are actions or inactions by the flight crew that lead to deviations from organisational or flight crew intentions or expectations. Not managed they can lead to undesired aircraft states. Examples could be lapses in handling, executing a wrong automation mode, ATC clearance readback errors or procedural errors. Again, there are many more and we've all fallen foul to a lot of them. Good teamwork goes a long way in this area with active monitoring

and an environment where everyone feels comfortable to speak up is essential, with assertiveness if necessary. We also have plenty of warnings on the flight deck that will confirm an error such as TCAS, GPWS and perhaps weather radar if we're inadvertently flying toward bad weather.

Let's also not forget we have SOP's and checklists available to us which is often said are written in blood as they are there to capture an error that has been made previously. I'm sure we've also mentioned this next one a few times which emphasises its importance and that is that of a good brief so we're both in the loop with our mental models of how departures or arrivals are flown as well as keeping us all at a high level of SA throughout the flight.

Lastly, undesired aircraft states which can often be because of mismanagement of threats and errors. These can include things such as lining up on the incorrect runway on approach, exceeding ATC speed restrictions, landing long, unstable approaches, taking a wrong taxi route or incorrect systems configuration. We need to realise these errors as a crew and then manage them effectively to restore safety margins. The inability to do this could lead to additional error, incident or even accident.

There are times when we need to switch from TEM to undesired state management. An example would be say if we select an incorrect approach from the FMC. We only realise this just prior to the FAF. Here we need to go into undesired state management which would be a reversion to a basic mode or perhaps even going around for another go. Instead, we could become preoccupied in reprogramming the FMC and as a result we fly through the LOC and become unstable. Here we are getting locked into error management rather than making that switch to undesired state management.

We need to train to use the TEM framework to recognise when we are in an undesired state and realise that our basic task is then undesired state management to produce the correct outcome through correct intervention.

EBT training is certainly here to stay and the way it evolves using a multitude of current data sources should keep it relevant going forward. Having a good look at how your company looks at the implementation and checking of these competencies will help you during recurrent training and hopefully with day-to-day operations where we all know the unforeseen often rears its head.

Thanks again for listening to the Boeing 737 Talk and we'll look forward to seeing you again next time.