Should Reporting Programmes Talk to Each Other?

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Abstract

British Airways employs two self-report programmes through which safety issues are communicated to the Safety department and Flight Operations. The primary channel, the Air Safety programme, collects data on technical, environmental, operational and crew issues. The ASR programme is an open reporting system managed by Flight Operations and its database holds the original reports, including crew names, and records whatever actions were undertaken. Naturally enough, whereas crew are more than happy to report technical or environmental problems, human nature makes crew more reticent in reporting issues when crew may have under-performed. The secondary reporting vehicle is the Human Factors Report programme that focuses on human performance and the factors that help or hinder it. The programme is voluntary and confidential and is managed by Safety Services. No crew names are recorded and no individual reports are published. The Safety department communicates relevant issues to Flight Operations. Here the two programmes and their interrelationship is described. A comparison is made of how each programme analyses the issues involved in the 'go-around' manoeuvre. It is argued that the power of the Air Safety analysis combined with Human Factors analysis is a more powerful tool than the simple sum of the two parts.

Introduction

Collecting data on safety failures and successes, collating and learning from this data, and applying this knowledge towards the improvement of safety are fundamental requirements in any industrial organisation. This is particularly true in high risk, high technology industries such as the nuclear, chemical and aviation industries. Ignoring these requirements results in the inability to manage safety effectively as those concerned will be unable to prioritise their risk management – even if they know which risks they face. Collecting the required information can be achieved in many ways. Internal reporting systems both automated and human are perhaps the most precise ways of safety data collection but it is also important to expand the focus and learn from other organisations, both within and without their own industries - and possibly from other departments in their own organisations. Learning from one's own mistakes is only bettered by learning from other peoples' mistakes!

Reason [1] eloquently and elegantly described the necessary feedback mechanisms required to establish effective safety feedback within an organisation (and, of course, such mechanisms can also be used for financial and commercial management) but what is sometimes overlooked is that Reason also recognised that multiple feedback loops were better than a single one. Amongst others, British Airways (BA) also realised this and over the last dozen or so years has developed a multiple loop feedback system for safety management. Some of these loops are self-report programmes but the system also includes automated flight parameter monitoring, safety process auditing, risk assessment, and maintenance monitoring and investigation programmes. Each individual feedback loop is embodied in a module of the British Airways Safety Information System, BASIS. Here I will focus on two self-report programmes used by flight crew. These are the Air Safety Reporting (ASR) and Human Factors Reporting (HFR) programmes. To draw the necessary comparisons between these two programmes I will use a 2002 study that examined how well flight crew were managing ‘go-arounds’, a manoeuvre in which crew abort a landing at a late stage in the approach.

The Air Safety Reporting Programme

The ASR programme is the primary reporting vehicle for the passing of safety information from flight crew to flight operations management. The programme is mandatory and requires a report on any incident affecting air safety. It prescribes about 30 specific incident categories that must be reported and, moreover, it requires crew to report any incident that did or might influence air safety. Air Safety reports are written on a standard form which requests many specific details concerning the flight circumstances such as the time of day, the weight of the aircraft and precise details of the aircraft’s flightpath and position, as well as a (usually) short text description of the event. These data are stored in the ASR database. Analysts encode the reports with a small selection of BASIS References that characterise what kind of event had occurred, and also with a selection of BASIS Keywords that help describe the event more precisely. It should be noted that both References and Keywords are intrinsically negative, i.e., they indicate failures or factors that degrade safety. Below, this will be contrasted with the factors employed in the HFR analysis.

The References are largely high level causal categories such as ‘ATC’ or ‘Pilot Handling and Airmanship’. Keywords are used for lower level description of the events. Both References and Keywords can be used as keys to filter the database for specific types of events or issues. The frequencies of these can be graphically displayed over time or location or any one of a number of other factors. For instance, it might be required to examine the relative frequencies of go-arounds at a group of, or all, airports. This can be achieved with just a few keystrokes. Its ease of use allows accurate and rapid description and categorisation of all kinds of events and incidents. With approximately 8000 reports filed per year, experienced analysts can execute a risk assessment and make relevant and effective recommendations very speedily.

The ASR programme was the first of the many BASIS modules. Its success is largely due to its versatility. It includes basic filing cabinet functions such as storage and indexing; the facility to include analytic ‘keywords or ‘descriptors’ which also provides for a huge variety of search and filtering options; the search / filtering also supports a graphical system to indicate trends over time; and when networked (which is its normal mode) the built in communications processes provide an effective method of ‘actioning’ people and departments to investigate specific aspects of an event.

Another reason for the success of the programme, at least within BA itself, lies not in the technology but in the organisational culture in BA. The safety culture that supports such success results from hard organisational factors not (only) relying on the willing support of the flight crew. Successive CEOs have supported a vital corporate standing order that is directly concerned with the reporting of safety incidents. It states:

‘It is not normally the policy of British Airways to institute disciplinary proceedings in response to the reporting of any incident affecting safety.
‘British Airways will only consider initiating such disciplinary action where, in the Company's opinion, an employee has acted recklessly, or omitted to take action, in a way that is not in keeping with his/her responsibilities, training and/or experience.
‘The fact that the employee has fully complied with his/her responsibilities to report the circumstances and to co-operate fully throughout any investigation will weigh in his/her favour in the Company's consideration of the matter.

‘However, in the event of an employee failing to report a safety related incident that they have discovered, they will be exposed to full disciplinary action.’

It is clear from the above that management considers that learning from incidents is more important than punishing the ‘culprit’, and that the real crime is not to report at all.

The Human Factors Reporting Programme

Both the HFR and the ASR programmes are worth papers to themselves but the latter is more complex than the former and therefore a more extended description of the HFR programme will follow. However, as it too will be relatively short the interested reader might learn more from O’Leary, Macrae & Pidgeon [2].

Whilst the ASR programme gives excellent information concerning what problems were affecting our flight crew there has generally been little feedback on WHY these problems occurred (particularly if the problem was caused by the crew!), or on how effectively the crew coped with them. Without the knowledge of problem cause and crew coping mechanisms, management’s attempts at problem solving and anticipation were tentative. Consequently, a need was recognised for some form of proactive safety management tool and the human factors programme was introduced.

The HFR programme can be contrasted with the ASR in several ways. Unlike the ASR programme it is both confidential and voluntary due to the obvious sensitivity of reports that might frequently concern flight crew failures. Moreover it is managed by the Safety Services department independently of Flight Operations and run by line pilots who are specially trained in HF analysis. The issues raised in the reports are communicated to line management on a regular basis but great care is taken to separate the issues from the incidents in order to safeguard the identity of the reporters. The names of the reporters are not entered into the database.

When an ASR is filed, each crewmember of the originating flight receives a reply. If the ASR suggests that human factors might have been involved a human factors questionnaire accompanies the reply to the ASR. The HFR questionnaire elicits information with questions that mostly require descriptive answers. The questions are designed to help the reporter work through the incident quasi-chronologically and to help him or her recall the crew’s actions and the reasons for their decisions and actions. The reply rate from solicited reports provides further useful information on about ten percent of the ASRs.

Human Factors Report analysis is complex in comparison with ASR analysis. The questionnaire focuses on Why the event occurred and How the crew solved or coped with the situation. Details from HFRs are entered only into the HFR database and can be supplemented with information from the related ASR and with information from a telephone or (occasionally) a face-to-face debrief with the reporter.

Each report is analysed with a set of ‘Factors’ concerning ‘Crew Actions’ and ‘Influences’ on those actions. The factors can be assigned in a negative - safety degrading - sense and, just as importantly, in a positive - safety enhancing – sense. Once these Factors are identified they are linked together to create an ‘Event Sequence Diagram’ (ESD) illustrating the flow of cause and effect throughout the incident. There are four groups of factors. The first reflects observable / describable crew behaviour or actions that can be defined as safe or unsafe. Three further categories apply to different influences on crew behaviour. The four are briefly described below.

Crew Actions are of three distinct types. The first concerns the activities of handling the aircraft and its systems, e.g., 'System Handling'. The second is based on the human error types described by Reason [1], e.g., 'Action Slip'. Third is the group of Crew Resource Management Teamskills (Helmreich, Butler, Taggart & Wilhelm, 1995). These describe a number of activities involved in the safe management of flight, e.g., 'Workload Management'.

Personal Influences describe the subjective feelings of physical and mental well-being, emotion, stress, motivation, and attention as described by the reporter. Examples are 'Boredom', 'Personal Stress', 'Tiredness' and 'Mode Awareness'.

Organisational Influences are those that are directly controlled by the company. Examples are 'Training', 'Technical Support', and 'Navigational Charts'.

Environmental Influences are those over which neither the reporter nor the company has any control. Examples are 'ATC Services', 'Technical Failure' and 'Weather'.

Crew actions differ from the influences in that they are generally observable and reportable. The majority of the influence factors are not so easily determined. In a few cases the influences can be inferred but it is essential that the inference is based only on evidence not assumption. This is particularly important in the assignment of the Personal Influences. These are subjective reports of personal feelings, states of arousal and attention. Assignment of any of the Personal Influences requires a direct report of these states by the reporter, not an inference by the analyst or by another crew member.

In the Factor assignment process Event Sequence Diagrams (ESD) are created for each report in a graphics image in the HFR database using a custom-built graphical interface. Analysts create the ESD by considering each action and influence and establishing all their interactions with the others. The final product normally represents a set of converging branches leading to an 'operational problem' of some sort and then terminating with one or more factors that indicate how the problem was solved (or not!). A very simplistic model of an ESD is shown below (figure 1). The arrows are the causal links between the factors. It is important to note that they are intended to indicate the direction of cause or influence, not just chronological relationships.

Figure 1 - Basic HF Event Sequence Diagram

The HFR and ASR programmes differ in several respects and O'Leary, Macrae & Pidgeon [2] gives a summary of many of the organisational differences (some not mentioned above). However, the major difference from a safety perspective is that the HFR programme was designed to elicit information about crew behaviour before, during and after an event, whereas the ASR programme was designed to elicit information concerning the event types and to quantify their relative frequencies. The next section will describe an investigation employing data from both programmes. Both sets of data are individually interesting and valuable but together they offer much more than just the sum of the parts. Relying only on one or other set would offer the safety analyst a much impoverished picture.

The go-around study

A 'go-around' is a manoeuvre in which the flight crew abort the landing at a late stage in the approach and for BA flight crew it is a requirement to file an ASR whenever a go-around is executed. In the first six months of 2002, BA crew reported 403 go-arounds through the Air Safety Reporting (ASR) programme. In the same period five years earlier, in 1997, the total was 440. Adjusting for the reduction of flight sectors across these years (approximately 6%) the go-around rate has reduced marginally by 2.5% over the five years.

Applying the Reference 'Go-around' as a filter to the ASR database will list the subset of reports in which a go-around is reported and, of course, the lists for 2002 and 1997 would include 403 and 440 reports respectively. Normally, analysis includes more than one Reference but it important to realise that the References do not necessarily have a causal relationship with the headline event, just that they were somehow associated with the event. A few more key presses can create a further list of all the associated References in frequency order. The two lists below in table 1 relate to the two different periods above and show the top ten BASIS References (excluding the Reference 'Go-around' itself).

Table 1 - BASIS References applied to Go-Arounds in the first six months of 1997 and 2002.

Jan – Jun 1997 G/As = 440		Jan – Jun 2002 G/As = 403	
WEATHER	152	AERODRM/LANDING SITE	125
AERODRM/LANDING SITE	132	WEATHER	114
ATC	81	ATC	77
PILOT HNDLG/AIRMNSHP	53	PILOT HNDLG/AIRMNSHP	73
GPWS	34	FLIGHT CONTROLS	22
FLIGHT CONTROLS	19	GPWS	20
AUTOFLIGHT	14	LANDING GEAR	11
LANDING GEAR	8	CABIN EQUIPMENT	4
CABIN EQUIPMENT	4	NAV EQUIPMENT	2
AIRPROX	1	FUEL	1

The table shows some interesting comparisons. Only two References, 'AUTOFLIGHT' and 'AIRPROX' disappear from the 1997 column and are replaced by 'NAV EQUIMPMENT' and 'FUEL' in the 2002 column. Excluding those References the others differ only slightly in ranking across a period of five years. It appears we still suffer and report the same problems as five year ago. Moreover, if we exclude 'WEATHER', which seems to have been considerably worse in the earlier period, two of the top three References, 'AERODROME/LANDING SITE' and 'ATC' appear to have very similar frequencies if the 6% reduction in sectors flown in the latter period is taken into account. However, contrary to this, 'PILOT HNDLG / AIRMANSHIP' has increased by a relative 50%. In 1997, this Reference accounted for 12% (53 of 440) of the total whereas, in 2002, this percentage had risen to 18% (73 of 403). This Reference is characterised in BASIS as 'Events where the handling or airmanship of the flight crew was a factor in the incident'. Thus the data above suggest only that flight crew might have been a causal factor in the go-around. This is neither a very surprising nor explicit conclusion. Knowing that the crew was a factor is not, by itself, very useful for implementing a training programme that might assist crew in avoiding go-arounds.

This short analysis shows the benefit of the ASR programme as we can pick on an issue, pull out the data and quickly execute a short analysis that can indicate whether the issue is deteriorating, improving or just staying constant cross time – as in this case it appears to be. On the other hand we have not benefited much in terms of developing any useful idea of what are the real causes of go-arounds. Consequently we have gleaned little insight as to how we should go about implementing programmes directed towards reducing go-around frequency. A final aspect of the ASR analysis is that it is rare that note is taken of the occasions when the go-around itself was mismanaged. However, nearly three percent of crews reported that the go-around had been mismanaged in some way.

The present HF study took place against the background of renewed Flight Operations' interest in the go-around issue. When that work was undertaken the HF group in Safety Services undertook a short study to see whether we could extend and corroborate the ASR data described above. As the HFR programme offers a more sophisticated analysis of pilot performance than that available from the ASR programme, the HF analysis potentially offered a more detailed account of both the causes of go-arounds and of how well they were executed.

Human Factors Data Collection and Analysis

The return rate of the HF questionnaires is much lower than the ASR rate but the style of the programme and of the questionnaire elicits much franker and fuller disclosure of incident details than is normally obtained from an ASR. Consequently, in this study, the HFR programme's ability to elicit much more information on all aspects of an event potentially offered a much more thorough analysis than the above.

As previously described, both the actions and influences can be coded as safety positive or safety negative. In this study two lists of negative factors from each report were compiled. One list was for the factors that related to the flight immediately before the go-around was initiated and a separate list was composed of those relating to flight after the go-around was initiated. In this way the factors that had a causal role in the go-around could be analysed separately from those that resulted from the go-around. A similar analysis was applied to the safety positive factors.

The go-around HF reports were collected over the period between late April to early June 2002. A total of 132 HFR questionnaires were sent out covering 66 go-around incidents. The questionnaires were sent out with a covering letter explaining that this was a 'special' request for information for this go-around study. Fifty- four replies were received representing a return rate of just over 40%. This figure in itself is quite remarkable as it is over four times greater than the rate that would be expected from the normal operation of the HF programme. The 54 replies concerned 45 go-arounds. In nine cases reports were received individually from both the captain and the co-pilot involved in the same incident. As interest was primarily in the 'incident' rather than individual reports, when such 'paired' reports were received they were combined into a single incident analysis. Care was taken to eliminate double counting of factors when combining the reports concerning the same incident

From 45 incidents, 134 negative, pre go-around human factors were collected. The number of negative factors in each incident varied between one and ten as shown in Figure 2.

In the post go-around phase, shown in Figure 3, negative factors totalled 81 and the number in each incident varied between zero and eight indicating that 18 incidents had no post go-around internal or external disturbance. However, in 27 go-arounds some kind of problem had occurred It is interesting to note that 60% of the go-arounds did experience some internal or external disturbance contrasting dramatically with the less than three percent reported through the ASR programme.

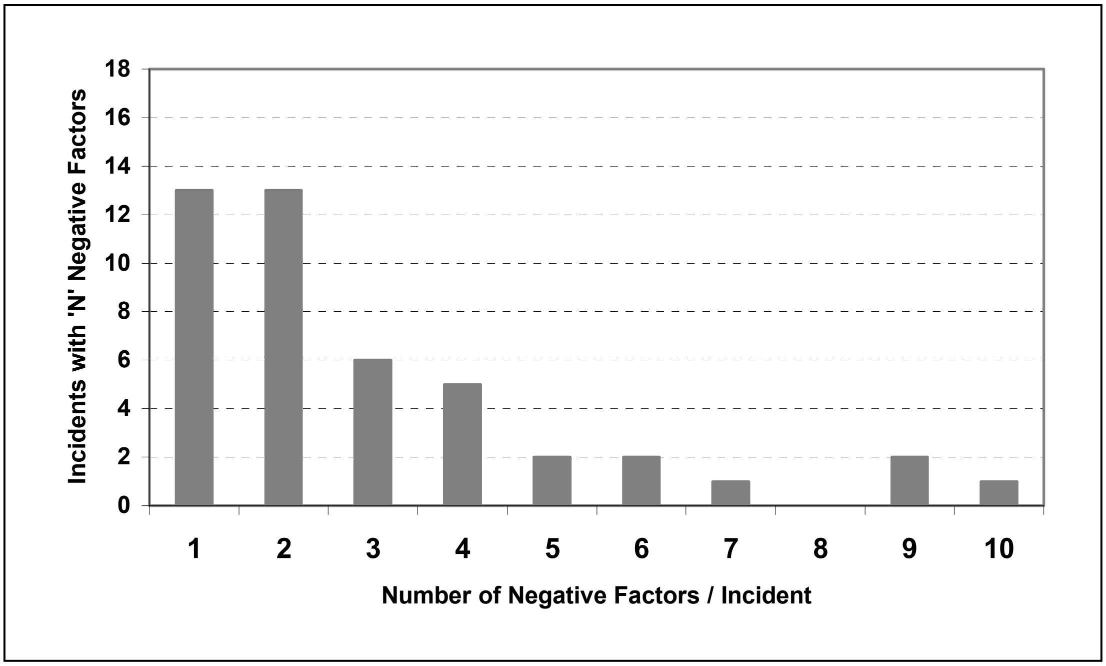

Figure 2 - Negative Factors per Incident Before Go-Around

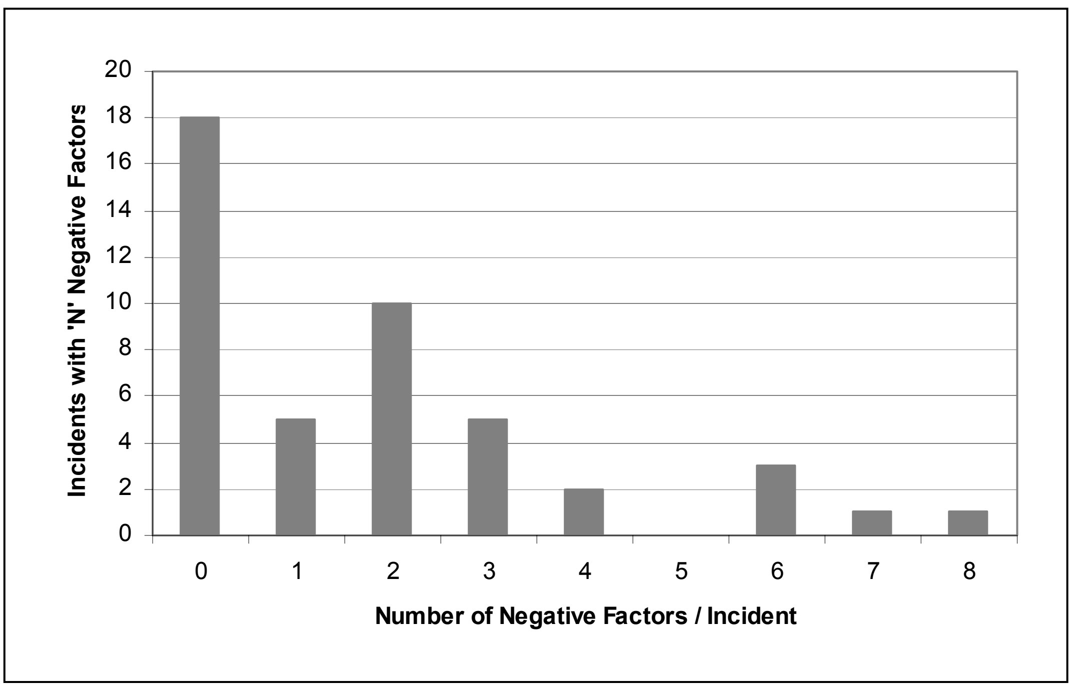

Figure 3 - Number of Negative Factors per Incident After Go-Around

Naturally, the most important aspect of this data is the identity of the negative factors in the analysis of the pre and post go-around phases. Table 2 below shows the 10 most frequently assigned factors separately for both phases. 'N' is the number of assignments for any particular factor. The 'Total Factors' indicate the sum of all factors assigned, not just the ten most frequent factors shown here, and the 'Total Incidents' for the post-G/A phase differs from the pre-go-around phase as 18 go-arounds were untroubled.

Table 2 - Negative human factors applied to the pre and post go-around phases.

Rank	Pre Go-around	N	Post Go-around	N
1	ATC Services	28	Cross-Checking	11
2	Other Aircraft	22	Ops Stress	11
3	Met Conditions	13	ATC Service	8
4	Handling-Manual	8	Error	8
5	Airport Facilities	7	Handling-Manual	7
6	Prep / Planning	6	System Handling	5
7	Crew Comms	5	Prep/Plan	6
8	Mode Awareness	5	Currency	4
9	Ergonomics	4	Workload Management	3
10	Error	4	Training	3
Total Factors		134		81
Total Incidents		45		27

Comparing the Negative Factors before go-around, the left hand side of Table 2, with the BASIS ASR References in Table 1 shows a strong similarity between the top parts of the lists. 'WEATHER', 'AERODRM/LANDING SITE', 'ATC', 'PILOT HNDLG/AIRMNSHP' in Table 1 are directly comparable with 'Met Conditions', 'Airport Facilities', 'ATC Services' and 'Handling-Manual' in the pre go-around list of Table 2. The use of the factor 'Other Aircraft' in the same list indicates that another aircraft was somehow involved in the incident. None of the BASIS References or Keywords then represented the involvement of another aircraft although in the new ASR analysis 'Other Aircraft' has now been included. The similarity between the top part of the two lists is not surprising given that both describe causal factors in the go-arounds. (Perhaps one should use 'probable cause' in the ASR data).

The lower parts of the lists, however, differ markedly. Whilst Table 1 focuses on the technical causes of the go-arounds, the lower part of the pre go-around list in Table 2 represents mostly human failings. 'Prep / Planning', 'Crew Comms' and 'Mode Awareness' are the most common failings indicated by the HF analysis. The more general term 'Error'[1] is used to combine all the specific error types that can be recognised from the reporters' description of the event. This analysis offers a much clearer picture of the issues causing go-arounds than the single term 'Pilot Handling and Airmanship' in the ASR analysis.

Comparison between the pre and post go-around lists within Table 2 is even more interesting. The top two factors in the post go-around list, 'Cross-Checking' and 'Ops Stress', do not appear at all in the pre go-around list. Nor indeed do four other factors, 'System Handling', 'Currency', 'Workload Management' and 'Training'. In a general sense, the factors point to the effects of operational stress or overload, which frequently appears to be induced by ATC. This is aggravated by lack of practice, 'Currency' and 'Training', and poor 'Prep / Planning' and

[1] The term 'Error' used here is a simplification used to represent a variety of error forms. The error forms and their definitions are included in Appendix A along with the definitions of the other human factors used.

'Workload Management'. The consequence of these failings and pressures are under-performance in the handling of the aircraft flight path and configuration, and failures in 'Cross-Checking'. This latter factor heads the post go-around list and is not only the discipline of cross checking actions and communications with the other crew member but, more importantly in this case, is the requirement for the standard calls to be made in the approved manner at the correct time.

Until now we have focussed exclusively on the negative side of the analysis. There is, however, still another interesting story to tell and it involves the positive factors that are derived from the analysis. Table 3 below shows the human factors that either kept the flight safe or that recovered the situation after it had gone wrong. As before, 'N' is the number of assignments for any particular factor. The 'Total Factors' indicate the sum of all positive factors assigned and the 'Total Incidents' for the pre go-around phase differs from the previous 45 as no positive factors were assigned to this phase for seven incidents. For the post go-around phase only a few factors were assigned, 15 factors in eleven incidents. These factors were all crew actions that were directly involved in correcting problems that had occurred during the go-around.

Table 3 - Positive Human Factors applied to the Pre and Post Go-around Phases

Rank	Before Go-around	N	After Go-around	N	
1	Prep / Planning	25	Handling-Auto	4	
2	ATC Services	18	Handling-Manual	4	
3	Environment Awareness	15	Crew Comms	3	
4	Crew Comms	12	Assertiveness	2	
5	Mode Awareness	10	Role Conformity	1	
6	Handling-Manual	8	System Handling	1	
7	Currency	5			
8	Handling-Auto	5			
9	SOPs	5			
10	Workload Management	4			
Total Factors		118		15	
Total Incidents		38		11	

Positive factors before the go-around: Of the top ten positive factors applied to the before go-around phase, by far the most frequent was the crew action, 'Preparation / Planning'. This has often been promoted as the most important of the Teamskills and is the focus of the often quoted 'six Ps', i.e., Prior Preparation Prevents Poor Performance. 'Preparation / Planning' is examined in more detail below.

The second most frequent factor was 'ATC Services' indicating ATC's role in instructing go-arounds when spacing became less than necessary. Situation awareness factors were high on the list as was 'Crew Communications' both of which are, of course, fundamental to good flight management and safety.

Preparation and Planning: The teamskill, 'Preparation and Planning' accounted for more than 20% of all positive factors in the before go-around analysis. While studying the reports it was clear that good briefing and preparation before the event mostly led to a successful go-around. To objectify this possibility a further analysis was undertaken to establish whether a link between positive 'Preparation and Planning' and a positive go-around outcome could be established.

The negative factors after a go-around have already been presented in Table 2 and Preparation and Planning appeared in the top ten list. The list is mostly composed of various skill failures such as ‘Cross-Checking’ and ‘Workload Management’. However, ‘ATC Services’, ‘Training’ and ‘Currency’ also appear in the list along with many other factors outside of the top ten such as ‘Commercial Pressure’, ‘Ergonomics’, ‘Tiredness’ and ‘Airport Facilities’. Consequently, a link between positive ‘Preparation and Planning’ and, for example, the number of post go-around negative factors would not be a valid comparison. It was necessary to establish whether a link exists between ‘Preparation and Planning’ and the success or otherwise of the go-around itself.

The database was therefore sorted along two dimensions, ‘Preparation and Planning’ and go-around ‘Outcome’. These two were divided into three categories, ‘Positive’, ‘Negative’ and ‘Not Assessed’. The ‘Not Assessed’ was used when there was not enough information in the report to establish either Positive or Negative ‘Preparation and Planning’ or go-around ‘Outcome’. Positive or negative ‘Outcome’ was determined on whether or not the go-around had been actioned without or with crew failure. The sorted data is presented in Table 4 below.

Table 4 - Matrix of ‘Preparation & Planning’ vs. Go-around ‘Outcome’ according to ‘Positive’, ‘Negative’ and ‘Not Assessed’ classification

		PREPARATION & PLANNING		
		Positive 27	Negative 11	Not Assessed 16
OUTCOME	Positive 32	23	1	8
	Negative 18	4	10	4
	Not Assessed 4	0	0	4

Interpreting Table 4 is not difficult. If ‘Preparation & Planning’ is positive then you have a likelihood of 23/27, 85%, of having a positive go-around outcome. Conversely if ‘Preparation and Planning’ is negative you have a ten to one chance of having a negative outcome. Other details in the table pale into insignificance in view of the above.

Summary

The go-around study combined the best of both worlds. The historic and statistical data from the ASR programme showed that the issue of go-around frequency and the major factors involved were unchanged over five years. With this starting point the application of human factors offered a fine-grain analysis of the issues and crew behaviour in the go-around scenario. Not only did it show where things were going wrong but also where some crew were being more effective than others in the application of teamwork and communications. This offers not only lessons to other crew but can also be used by training managers to implement effective training programmes.

I suggested in the introduction that organisational feedback loops are better in numbers rather than as singletons. Naturally the organisational structure and culture will define what precisely is required but the very simple example offered here indicates that co-operative feedback loops can operate very effectively – together. Certainly in BA at least, there is a need for an ASR system that can amass huge numbers of reports and use them very effectively with statistical authority. It can show where real problems exist or where problems may be emerging by evaluating statistical trends in operational issues. There is also enormous value to be had in the human factors approach which, with a more precise and directed analysis process, can illuminate the important detail essential not only for understanding the problem but also for effectively specifying the effort required to reduce or eliminate the problem. Neither programme can do all these things entirely independently.

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Biography

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Appendix A: Definitions of Factors used in Table 2

FLIGHT CREW ACTIONS
CREW COMMUNICATION: Communication on the aircraft was not effective in informing everybody (including ATC) of relevant operational decisions, uncertainties, intentions, actions and aircraft/system states. Informing other crewmembers of stress and overload are also important aspects of this topic.
CROSS CHECKING: Indicates that standard calls and cross-checks were omitted, ineffective or deficient..
HANDLING – MANUAL: Manual flight handling degraded flight safety. Manual handling is to be understood as the direct manipulation of aircraft flight path and configuration. This can be effected either through the use of normal flight controls or through FCU / APFD or FMS, however it should result in an immediate change of flight parameters or configuration. (This factor is used when use of manual or automatic control cannot be ascertained. See following two factors.)
PREPARATION/PLANNING: Indicates that tactical (i.e., short term) pre-flight or in-flight planning and preparations were ineffective, omitted or inappropriately abbreviated.
SYSTEM HANDLING: Indicates faulty handling of aircraft systems, e.g., mechanical or electronic, or strategic handling of flight control systems through a FMS.
WORKLOAD MANAGEMENT: A failure of workload distribution, task priorities, distraction avoidance
ERRORS
ACTION SLIP: Indicates that a correct action was planned but an incorrect action was carried out unintentionally. E.g., selecting one switch in the belief that it was another, not because of ignorance of switch location but from absent-mindedness or distraction.
MEMORY LAPSE: A planned action was unintentionally omitted. We can assume that drills, checklists and procedures are 'planned'. Forgetting to complete, for instance, the Before Takeoff checks is a lapse.
MIS-RECOGNITION: Perceptual misinterpretation of visual or auditory data. E.g., mishearing ATC clearance, misreading instruments.
MISTAKE: An action was carried out as planned but the plan was faulty.
MISUNDERSTANDING: Conceptual misinterpretation of information. E.g., fault misdiagnosis, misunderstanding of manuals or clearances.
INFLUENCES ON FLIGHT CREW ACTIONS
AIRPORT FACILITIES: Airport facilities such as lighting, navigational aids or jetty docking facilities, were of poor quality or design causing operational difficulty.
ATC SERVICES: ATC instructions were unhelpful, led to unnecessary workload, conflicted with reasonable expectations or created an unsafe situation.
CURRENCY: Under-performance due lack of recent practice, or unfamiliarity with an airfield.
ERGONOMICS: Design of controls, displays or systems made them unfit for their intended purpose. This factor can be used in the case of 'degraded information' from displays and warnings etc.
MET CONDITIONS: Any meteorological condition that caused an operational difficulty.
MODE AWARENESS: Poor awareness of aircraft configuration, flight and powerplant parameters, flight control system modes, and the dynamic (rate of change / time to go e.t.c.) aspects of all of these. The parameters include such aspects as attitude, speed, altitude, heading, distance / time to go, and selected / armed / acquire / hold modes and the state of FMS data input and flight planning functions.
OPERATIONAL STRESS: Stress causing operational difficulty because of high operational workload or poor workload management. E.g., difficult procedures and drills, high workload departures / arrivals, or everything happening at once because of poor planning or organisation.
OTHER AIRCRAFT: Indicates that another aircraft caused an operational difficulty (e.g., runway occupation).
TRAINING: Indicates a training deficiency has been reported.