Guidance Material and Best Practices for Pilot Aptitude Testing

Effective March 2012

2nd Edition

Guidance Material and Best Practices for Pilot Aptitude Testing

Effective March 2012

International Air Transport Association
Montreal–Geneva

2nd Edition

NOTICE

DISCLAIMER. The information contained in this publication is subject to constant review in the light of changing government requirements and regulations. No subscriber or other reader should act on the basis of any such information without referring to applicable laws and regulations and/or without taking appropriate professional advice. Although every effort has been made to ensure accuracy, the International Air Transport Association shall not be held responsible for any loss or damage caused by errors, omissions, misprints or misinterpretation of the contents hereof. Furthermore, the International Air Transport Association expressly disclaims any and all liability to any person or entity, whether a purchaser of this publication or not, in respect of anything done or omitted, and the consequences of anything done or omitted, by any such person or entity in reliance on the contents of this publication.

Senior Vice President
Safety, Operations and Infrastructure
International Air Transport Association
800 Place Victoria
P.O. Box 113
Montreal, Quebec
CANADA H4Z 1M1

Guidance Material and Best Practices for Pilot Aptitude Testing
ISBN 978-92-9233-779-7

Montreal–Geneva

TABLE OF CONTENTS

ACRONYMS

A/C	Aircraft
ATPL	Airline Transport Pilots License
ATO	Approved Training Organization
CPL	Commercial Pilots License
EASA	European Aviation Safety Agency
FAA	Federal Aviation Agency (US)
FBS	Fixed-Base Simulators
FCL	Flight Crew Licensing
FCLPT	Flight Crew Licensing and Training Panel
FFS	Full Flight Simulator
FTO	Fight Training Organization
ICAO	International Civil Aviation Organization
IOE	Initial Operating Experience
IR	Instrument Rating
IT	Information Technology
ITQI	IATA Training and Qualification Initiative
JAA	Joint Airworthiness Authority (Europe, pre-EASA)
JAR	Joint Airworthiness Regulations
KSA	Knowledge, Skills and Attitudes
MPA	Multi-Crew Aeroplane
MPL	Multi-Crew Pilot License
PAN-TRG	Procedures for Air Navigation Services – Training
PC	Personal Computer
TEM	Threat and Error Management

FOREWORD

Dear Colleagues,

It is my pleasure to present the second edition of the IATA Guidance Material and Best Practices for Pilot Aptitude Testing.

The creation of this manual was identified as one of the IATA Training and Qualification Initiative's priorities to preserve and improve operational safety in civil aviation.

The data within the manual is based on an online survey that was conducted in the summer of 2009.

Despite the clear benefits of a proper pilot selection process, the results showed that only a minority of airlines have a specific selection system in place that is structured and scientifically-based.

This guidance material covers many of the aspects necessary to understand, construct and run a successful Pilot Aptitude Testing system.

I would like to thank the members of the ITQI Project Group Selection and the airlines that have contributed to the development of this material.

To obtain more information about the different publications that were developed under ITQI, please consult our website at: www.iata.org/itqi

Best regards,

Günther Matschnigg,
Senior Vice President
IATA Safety, Operations & Infrastructure

EXECUTIVE SUMMARY

Manual objective: to support all airlines. In recognition of the changing industry environment, this manual is designed to enable airline recruitment managers to implement modern practical pilot aptitude testing systems in their organizations. Operational decision-makers, aiming to recruit the best candidates, face the dilemma of selecting between similar testing systems offered by various providers with varying document terminology. This manual should enable more informed selection.

Assumed Pilot Applicant Pool: A direct relationship between recruitment pool size and success of pilot aptitude testing (PAT) has been seen. The larger the recruitment pool, the better the PAT results. An adequate supply of pre-qualified and interested applications from which to select (for an airline career) are an assumed basis for this manual, which deals with selection and pilot aptitude testing. Initiatives to address a shrinking recruitment pool are beyond the scope of this manual.

Selection Systems: The term pilot aptitude testing is used as hyponym, overarching all areas of pilot selection including aptitude diagnostics (basic abilities, specific/operational abilities, social competencies and personality traits).

Measurement dimensions: The primary measurement dimensions of pilot aptitude tests are:

a) Basic abilities (physical and mental)
b) Operational competencies
c) Social competencies
d) Personality traits

System performance: The performance of an aptitude testing system can be measured by an evaluation of the following factors:

a) Test reliability
b) Test validity (especially predictive validity)
c) Ratio of the selection rate (number off successes) versus hit rate (on-site success rate with regard the test criterion)

Testing tools of choice: The least qualified testing instruments are freestyle interviews, while some of the higher qualified testing instruments involve psychometric testing. Classic flight-simulator checks are suitable to quantify the amount and type of training needed for selected personnel, and provide some confidence in the validity of previous experience, in case of ready-entry pilots, but they are not so suitable for testing aptitude. Simulation-based testing of operational competencies can be performed best on specifically programed (PC-based) low fidelity simulators, since they provide high values of predictive validity. Multi-stage testing systems (less expensive screening procedures first, costly selection procedures last) are most advisable.

Selection team and result: Hiring decisions should be made by a dedicated selection team. In the interest of safety and fairness and, assuming that the aptitude testing system has been professionally developed implemented and validated, the hiring decision should be based solely on test results.

Regulatory issues: Medical examination, language proficiency and the ability to comprehend training course content are specific ICAO requirements for training. National regulators worldwide have been reluctant to develop guidance on personality, yet this criterion is most important for flight crew. There are some general guidelines for assuring the best psychological aptitude of applicants, but there is a lack of definitive material available. Equal opportunity legislation, data protection rules, legal provisions for professional aptitude testing and aspects of cultural diversity must be considered to ensure that ethical and legal aptitude testing is achieved.

Benefits: Professional aptitude testing for airline pilots, if correctly implemented, can contribute considerably to cost savings and enhanced safety for an airline. Selection is the first point of action, where no costs have yet been sunk, and improving this part of the process is critical to the avoidance of future risk and cost. The costs associated with implementing an effective aptitude testing system are significantly lower than subsequent costs of high failure rates resulting from immature selection. Benefits include enhanced safety, lower overall training costs, improved training and operational performance, more positive working environments, reduced labor turnover, and enhanced reputation of the airline brand.

1 INTRODUCTION

Human factors: IATA supports investments in human performance, since human factors continue to account for the majority of aircraft accidents. The airline accident rate has plateaued in recent years, and more growth is likely to lead to more accidents unless this rate can be further reduced. More effective PAT, as part of the IATA Training and Qualification Initiative (ITQI), has become an important initiative to enable quantifiable reductions in accident rates.

Identified needs: Historically, military organizations and large operators with high volumes of applicants have access to mature selection systems. Ironically, smaller organizations which tend to have the highest turnover of personnel are often less capable of developing and maintaining an effective aptitude testing process. Over time the product of suboptimal PAT may become a safety issue, especially as the experienced pool dries up. As airlines face industry growth, decreasing numbers of experienced airline and military pilots will be available for direct entry, and a large number of operators will be forced to source from the general aviation market, and cadet entry.

Survey: In order to address the PAT challenge from industry evidence, IATA conducted an online survey[1] of member airlines and associated operators. This survey was designed to review industry selection practices in support of the production of this manual, posing 91 questions covering areas of organization/training/hiring, psychology, methodology and financial aspects of PAT. Full details of the survey and results can be found in Section 3.

Single source document: The manual contains, in a single-source document, a summarized overview of the most important aspects of aptitude testing. Although large well-established operators may already enjoy mature selection processes, the industry is changing rapidly, and a review of the PAT manual by all operators is likely to support greater efficiency and system safety.

Improving the selection process: Rather than just "gearing up for more pilot training", we must also ask the question: *"Who are we looking for to man future commercial airliner flight decks?"* In consideration of new needs, selection must be re-geared.

Attributes to enhance: Find fundamental attributes of the new generation pilot pool for teamwork development, and capitalize on their improved self-learning styles and rapid knowledge acquisition.

Target attributes: The operational requirements of airliners from generation 1 to 4 are well understood, and generation 5 is some time away. The target attributes required for a safe airline-piloting career are therefore universally standard and should be considered independent of culture and generation.

Adapting to change: Nevertheless, contemporary characteristics and motivations of new generations from different regions must be accommodated in the selection process. Appropriate adjustments must be made to maximize efficiency. Pilot aptitude testing therefore warrants a fresh review for the benefit of those operators who have well-established legacy selection processes, as well as those start-up operators. This manual attempts to provide a toolbox of solutions and best practices for all.

Safety and growth: There are concerns that under severe industry cost pressures, the quality of selection and training may have subsided towards minimum standards, or at least failed to adapt to needs. Despite regular industry commitments to safety, and recognition that competent pilot performance is critical, current selection processes may not be optimal to new industry requirements. While crew training is a driver for operational safety, the quality of recruits entering the industry is the primary key. In periods of strong growth, pilot supply comes under increased pressure. If the quality of new entrants declines, longer-term operational safety may be compromised, and the task of training organizations becomes more challenging.

[1] The survey took place from 11 June 2009 to 5 August 2009.

Management input: The design phase of an aptitude testing system requires high management attention (definition of the job requirements, application/re-application criteria, presentation of results, evaluation procedures) and the involvement of aviation psychology expertise or professionals with experience and expertise in the aviation human factors arena.

Management questions: Are current systems valid? Despite some skepticism amongst pilots regarding the viability of testing human behavior, there are numerous examples of aviators who have initially failed entry-level testing with legacy carriers and subsequently became highly successful professional pilots for other carriers. Ironically, many of these pilots were re-examined at a later date and hired as ready/direct entry pilots by the original testing airline to ultimately enjoy a seamless career. Some of these pilots were subsequently promoted to leadership positions within the legacy carriers because of their previous experience. This illustrates the need to clarify the following questions:

- How accurate are current industry selection practices?
- Is there enough research data available for the development of a consensus for job requirements and aptitudes?
- Are our aptitude testing instruments capable of measuring with reliability and validity and provide a long-term prognosis of the behavior of a candidate?

Study: An in-depth study of the fundamentals will answer these key questions. Additionally, this process can reveal areas of aptitude testing that work well and are commonly accepted, as well as those areas of testing where relatively new methods are under development.

Career disclosure to applicants: Today few pilot candidates in selection are fully advised of the volatile nature of the airline industry. While effective selection requires that the employer must learn about the applicant, the applicant also has the right to know about the career ahead including both the negative and positive aspects. This is important to avoid later disappointment and motivation loss, which can translate into risk. Clarity regarding career prospects ahead is vital at the outset, as time and money spent at the start of the career will be better spent when compared to millions lost in failure or demotivation downstream, for those with false expectations. Applicants should have realistic expectations at the start.

Length of the selection process: For the primary selection process, only a 'few days' of actual selection time are often allocated to this important task. Hardly sufficient to provide the level of confidence in an individual you may employ for the next 30 years. A more extensive selection and grading process should be considered, including motivation, flight suitability, and simulation assessment over a reasonable time period. The output of this process is one of the most important investments in the industry. As a guide, military Air Forces and some airlines already allocate 3-4 weeks for the complete process.

Simulation-based testing: The highest degree of difficulty becomes apparent when testing operational competencies of pilots in complex and dynamic situations. In order to measure, evaluate and predict this dimension of human behavior reliably, adequate simulation-based environments need to be developed and used. Currently, these testing environments are only available on a limited basis in very few testing facilities.

Note: A simulation-based testing environment must not be confused with full-flight simulator testing, which is traditionally used in assessing flying skills and for determining the type and quantity of training needed for new pilots.

Selecting team players: Airline operations are now so complex that pilots cannot be expected to know or understand systems to the extent previously required, but they need to know where to look and access information. As the systems become more complex, more focus should be on multi-crew operations. Although routine activities on flight decks have been automated, many new airline system challenges have emerged, demanding responsive management and teamwork skills at ever-increasing levels of quality.

Part of the airline quality system: Effective quality control of selection and training process may add some initial cost, but will reduce risk and cost later in operations. The process must be a collaborative effort between all involved parties (Human Resources, Flight Operations, Training and Aptitude Testing).

Performance feedback and continuous improvement are essential to effective aptitude testing processes. Together with the implementation of an aptitude-testing scheme, it is important to establish an effective, data-based evaluation process. A continuous open link for communication of the data from the training/operations departments to the testing team will ensure that over time the right applicants are identified and selected with ever-increasing reliability. The airline industry is entering an era of more comprehensive performance measurement, and it is therefore relevant that the selection 'product' should be measured downstream to back-drive improvements and save cost.

Performance feedback data related to selection may include:

The Individual
- ↗ Performance in training and initial skills test
- ↗ Base training
- ↗ Initial Operational Experience (IOE)
- ↗ Recurrent checks

The airline:
- ↗ Line Operational Safety Audit (LOSA) data
- ↗ IATA Operational Safety Audit (IOSA) data
- ↗ Flight Operational Quality Audit (FOQA) data

INTRODUCTION SUMMARY

A major upgrade of the airline pilot selection process should consider the following:

1. Attributes, qualities, motivations, and attitudes of new generation pilot pools are changing and job requirements have also changed since earlier selection processes were established.
2. Be aware of parallel initiatives such as ICAO Next Generation of Aviation Professionals (NGAP) and IATA Training and Qualification Initiative (ITQI), working to re-invigorate youth interest in piloting careers to secure the large volume and quality of applicants needed.
3. Continuous feedback from operations back to selection is essential for continuous improvement.
4. As growth and other factors impact safety, selection of the right personnel becomes even more critical.

The rapid development of hardware has exposed unresolved limitations in human-ware in cockpits, but humans remain the last line of defense in the error chain. Improved pre-education, selection, and training are the most fruitful targets for improvement if the accident rate is to be driven down further. ICAO, through the Next Generation Aviation Professionals (NGAP) initiative, and IATA, through the IATA Training and Qualification Initiative (ITQI), have both recognized the importance of selection and training of professionals.

2 PILOT APTITUDE TESTING

2.1 SAFETY AND HUMAN PERFORMANCE

Pilots' role and safety: Safety is the number one industry priority and therefore accident prevention is crucial. Being a professional pilot is a demanding role, defined by a number of operational requirements and influences. The role is directly linked to the safety of an airline passengers and financial performance.

Human error consistently accounts for the majority of all aircraft accidents therefore investment in human performance is essential. Investment in the selection process is the foundation of any effort to achieve a quantifiable reduction in accident rates. Human performance is becoming even more relevant because of accelerating innovation and technological change as a result of research and development in the aviation industry. This process of continuous improvement induces changes in the job requirements for pilots and consequently drives the need for continuous adaptation of pilot behavior and airline training methodologies. We cannot rely solely on past experience, because current and future generations of pilot candidates are also evolving. The implementation of a robust and transparent aptitude testing system process will allow an airline to ascertain whether or not a pilot is willing and capable of accepting the inevitable pressures of life-long learning, and training and checking, which are pre-requisites for flying technologically advanced aircraft.

Testing range: The need for applicant aptitude testing across all dimensions of required performance potential, including social interaction, and optimal personality is undisputed, to ensure a good fit between the requirements in testing and the human performance limitations of the pilot. This demands the following:

- ↗ The need to develop and implement effective systems to define job requirements
- ↗ The need to develop and implement effective systems to measure human performance
- ↗ The need to identify appropriate candidates who best match the job requirements
- ↗ The need to identify appropriate candidates who are motivated to maintain their performance with a lifelong commitment
- ↗ The need to establish a system to gather, collate, verify and evaluate performance data to validate testing solutions and ensure continuous improvement of the aptitude testing system

Process variety: The development of a qualified diagnostic system for aptitude testing is time consuming and can be costly. Historically, military organizations and large operators with high quantities of applicants generally have access to robust and mature screening and selection systems.

Smaller organizations, which tend to have the highest turnover of personnel, are usually less sophisticated in developing and maintaining an effective aptitude testing process. The latter may be considered a safety issue, especially as the pool of experienced applicants grows smaller.

Growth: As airlines face growth, fewer experienced airline and military pilots will be available and a large number of medium and small size operators will need to recruit their staff from the general aviation market. In some regions there is no significant general aviation, and the shrinking pool of experiential knowledge will present more dramatic challenges for operators who will become increasingly dependent on cadet entry. This scenario necessitates even more rigor in all selection processes.

2.2 EFFICIENCY

The implementation of a professional aptitude testing system has proven to be highly effective and efficient. It has become more affordable but may still be perceived to be a high cost. If correctly implemented however, an effective aptitude evaluation process for pilots can contribute to considerable cost savings for the airline.

Source pools: In highly developed regions of the world, up to 30% of well-educated young people may be 'qualified' to become a pilot. This means that a randomly performed selection would only produce a hit-rate[2] of 3:10, which means that 7 out of 10 candidates would encounter difficulties in their career. Airline experience has shown that the costs associated with implementing an effective aptitude testing system are significantly lower than the costs of subsequent failure resulting from immature selection or screening. Unfortunately today most operators still do not have effective feedback systems to robustly analyze failure rates in relation to their selection process.

Consequences of failure: The consequences of failures are complex and difficult to predict. Negative outcomes are not limited to wasted training costs, but also trainee and trainer disappointment, potential legal costs and damage to the airline's brand within the target population. High failure rates could also be erroneously viewed as reflective of poor airline training quality.

Targeted training and success rates: A positive outcome of sound screening and selection process is to enable tailored training to target groups, which can save cost. Data shows that training success rates are higher in organizations using a robust aptitude testing system, and that the use of such a system also contributes to a better working environment; and reduces labor turnover rates.

Holistic effect: A mature aptitude testing process leads to the stabilization of performance of selected staff at equal and/or higher levels. Training management experience has shown that, within a successful group of pilots, the process of standardization of procedures and other professional requirements is much easier to achieve due to the homogenous nature of the group. This can also lead to an enhancement of reputation of a flight operations department and airline brand.

Safety Culture: A cornerstone of an airline safety culture must include the performance of its first officers and captains. A well-developed testing process is effective in ensuring not only the professional abilities such as flying skills of applicants, but that these professionals are well educated, have appropriate experience, possess sufficient motivation to adapt, and demonstrate identification with the company and its safety culture.

2.3 FAIR TESTING

Fairness: As the number of candidates for airline pilot positions generally exceeds the number of available positions, employers must accept their corporate and social responsibilities by utilizing a fair selection system. Fairness can be defined by a good system that achieves the best results within a defined socio-economic environment. The elements of a good system are described in this manual.

Casual methodologies: Many operators do show interest in professional selection systems. However, due to manpower, time and cost constraints, minimal methodologies are often accepted, commonly known as "casual" selection methodologies. Typically, these methodologies have been developed in-house by the airline flight operations or training departments without any significant involvement of specialists with appropriate aviation human factors experience. Therefore, if there is no systematic method of test data evaluation, and hiring decisions are not based on reliable objective judgment. Casual systems often lack the explicit selection standards required to reach an objective decision, and judgments are based on general perceptions of what 'makes a good pilot' or what 'embodies good airmanship'. The least effective selection system is one in which hiring decisions are based on freestyle interviews only and spontaneous assessments in non-standardized flight simulator test scenarios.

[2] Hit rate definition: success rate with regard to the selection criterion

Structured testing: Research has shown that structured aptitude testing systems are much more effective than casual unstructured systems (hit rates of 95-98%). Recognizing that many of the candidates are self-sponsored ab-initio students, it is fair to start with a professional assessment of their aptitude before they are advised to invest in expensive flight training programs. This will potentially avoid the scenario in which candidates later realize that they cannot keep pace with the speed or content of the training course or the performance standards of the employer.

2.4 RISKS OF NOT TESTING APTITUDE

Training as a selection tool: An argument often raised by training providers is that training itself constitutes the most realistic assessment and selection platform. But failure costs mount as the student progresses into the training. Also the argument itself is not supported by facts, as selection during the training process generates low values of predictive validity. Flight instructors may be able to judge specific flying skills or competencies of a candidate over time but due to the variable nature of multiple factors in this approach, a standardized assessment is difficult to produce. Frequent instructor changes and insufficient instructor experience and training in aptitude testing make it impossible to reliably diagnose important measuring dimensions such as personality traits, socio-interactive abilities and basic or specific mental abilities.

Slipping through: Many cadets manage to get a license despite some challenges during training, and as their flying experience increases, they learn to compensate for their weaknesses in normal operations. However, their deficiencies may resurface (several deficiencies may even compound or overlap) when the pilot encounters complex challenging situations with high performance demand, especially during times of fatigue and stress. The more reliable and cost-effective solution is to perform professional aptitude testing for candidates prior to the start of their training.

2.5 QUALITY ASSURANCE

Training and human resource development systems are now accepted as superior methodologies in most critical industries. In order to plan and manage content and quality of training programs, it is extremely important to assess qualifications, abilities and knowledge of trainees and their potential for progression within the organization. The knowledge gained through this process will then provide a reliable and resilient basis for a functional quality assurance process. The implementation of innovative changes can be tailored to the existing competencies of the target group. At the planning stage it is therefore essential to design training programs with built-in performance feedback mechanisms back-driving the selection process, enabling the quality system to fully function and improve.

The feedback loop: In order to improve the quality of human performance, selection, monitoring and evaluation processes must be data-based with good IT support. A quality system should be capable of administering, monitoring and recording human performance data from the start of the screening and selection process and then throughout the entire career of a pilot. So the metrics used should be aligned if possible with those used in operations (competencies and KSAs). This demanding task requires purposeful cooperation by all stakeholders, including Human Resources, Training, and Flight Operations Departments.

3 ITQI ONLINE PILOT SELECTION SURVEY

3.1 OUTLINE OF THE SURVEY

IATA's member airlines and associated operators participated in an online survey to study present industry selection practices[3]. Questions covered areas of organization/training/hiring, psychology, methodology and financial aspects of PAT. The survey results supported the production of this manual.

Participation: 327 organizations were invited to participate, and invitations were sent to major regional, corporate, cargo, low-cost, training and selection organizations across the globe. A total of 66 institutions contributed to the survey.

Survey Questions: The survey consisted of 91 questions, divided into the following three parts:

Part I Organization/training/hiring: A total of 42 questions were asked concerning existing selection, recruitment, hiring and training processes, including legal and quality assurance aspects

Part II Financial aspects: A total of eight questions concerning cost of selection, recruitment, training and contributions of involved parties.

Part III Psychology and methodology: A total of 41 questions concerning the structure of selection systems, their content and scientific models.

Confidentiality: De-identification of respondents and confidentiality of collected data was assured by IATA.

Response Summary: The following is a summary of the survey's response rate:

- 110 institutions responded to the invitation by logging in
- 6 institutions stated reasons for not being able to answer the survey
- 66 institutions completed parts or all of the survey
- 53 completed part I
- 19 completed part II
- 19 completed part III
- 12 completed all three parts.

Survey observations:

a) Accepted approach – the categories used to evaluate the issue of pilot selection, and the questions asked, were deemed acceptable survey design process by the respondents
b) Current selection systems appeared to lack a conceptual basis – there is a need for conceptual support in setting up an efficient selection system
c) Strengths and weaknesses – the mix of changes made and changes desired, affected the methodology used, more than organizational issues or efficiency of testing systems
d) Ready-entry pilots (low experience/direct-entry) are a diverse group. Predicting the performance of this group seems to be especially difficult. This is the least homogeneous group with neither license or flying hour levels to clearly assess pilot competency.
e) Selection for captains and first officers is undervalued – most selection systems have been established for *ab-initio* candidates, and these display a high degree of sophistication. Fewer and less methodically-qualified selection systems are in place for first officers. Selection systems used for captains display the least developmental quality and maturity.

Note: *The cornerstones of an airline's safety culture are the leadership skills of its first officers and captains. Therefore, investments in the professional testing process are of vital importance.*

[3] The survey took place from 11 June 2009 to 5 August 2009.

Summary of survey source data: The participating institutions combined reported having tested 28,414 people from 2006 to 2008. Some selection systems had been in place since 1955 – and most since the 1980's. The entire original set of questions and detailed results of the survey are presented in Appendix 1 – ITQI Online Pilot Selection Survey and Report. An overview of survey questions follows.

3.2 SUMMARY OF SURVEY QUESTIONS

Introduction

Question: State reasons for not answering survey questions.

PART I – Organization-Training-Hiring

Question: Which types of operations are you performing?
Question: Which kind of personnel are you employing/recruiting?
Question: How many candidates have been tested in total during the recent three years?
Question: How many candidates passed the selection process successfully in the last year?
Question: How many candidates did you hire (did you give a contract) in the last year?
Question: How long has your selection system been in place?
Question: Are you offering selection for other companies?
Question: What actions do you take to ensure a sufficient number of applicants?
Question: Which way according to your experience is the most effective one?
Question: Are there any preconditions for the candidates to be accepted in your selection process?
Question: How long has the definition of preconditions been in place?
Question: Has your state a legal requirement for selection of pilots besides ICAO medical provisions and language proficiency?
Question: Does your reg. authority perform any selection in addition to ICAO medical provisions and language proficiency?
Question: Does your reg. authority delegate any selection in addition to ICAO medical provisions and language proficiency?
Question: Does your reg. authority supervise any selection in addition to ICAO medical provisions and language proficiency?
Question: Do you employ foreign nationals?
Question: Is there any restriction with regard to the number of foreign nationals?
Question: Do you tailor recruitment campaigns to specific target groups?
Question: If "yes" according to which criteria?
Question: Who is performing the selection?
Question: In the case your own company performs the selection partly or in total, do you have a special procedure to identify selection team members?
Question: What is your process to identify selection team members?
Question: From where do they get their qualification for this function?
Question: Who decides about hiring of pilots in your company?
Question: Is the decision (hiring) solely based on results of the pilot selection system?
Question: How many years do you keep your selection results valid in the case you cannot immediately hire candidates and put them on a waiting list?
Question: How is the result of your selection process presented to the candidates?
Question: How is the result of your selection process presented to the hiring decision maker?
Question: Do you perform a reference check on Ready Entry/FO/Capt. candidates?
Question: Is your selection system incorporated in the QMS of your company?
Question: Is the organization performing the selection certified?
Question: Who maintains the selection system in terms of QM?

PART II – Financial Aspects

Question: What are the costs of your selection per candidate and group?
Question: What are the costs per new hire?
Question: How much do you invest per year in recruitment?
Question: How much does the candidate contribute towards the costs of selection?
Question: How much does the candidate contribute toward the costs of training?
Question: Do you receive any government incentives for recruiting, training, staff retention?

PART III – Psychology and Methodology

Question: For which of the defined groups do you have a selection concept in place?
Question: Do you address cultural diversity in your selection system?
Question: Based on which criteria did you adapt your selection concept to cultural diversity?
Question: Do you accept test results of other institutions?
Question: What do you consider the strengths of your selection system?
Question: What do you consider the weaknesses of your selection system?
Question: Did you make significant changes to your selection system in recent years?
Question: If you could, would you make any changes to your selection system?
Question: Do you have data about empirical evaluation of your measuring dimensions/ tests/test battery?
Question: Is your selection system tailored in a special way to your type of operation?
Question: If "yes", according to which special characteristics of your operation is your selection tailored?
Question: Which requirements in the selection concept cover the special characteristics of your operation?
Question: Do you distinguish in your selection system between psychologically based requirements and requirements which are due to the special interests/needs of your company?
Question: Do you address any specific characteristics of your target groups in the concept of your selection systems?
Question: Which type of selection instruments do you use for the different groups?
Question: Which grading system do you apply for the description of results in your selection system (and in your operation)?
Question: Are there any grading levels (positive, negative) which have obligatory consequences for the candidate?
Question: Do you only refuse candidates at the end of the whole selection procedure or do you decide after each step?
Question: Are there any measuring dimensions or instruments which have an accentuated higher weight for your evaluation than other ones?
Question: Which method for empirical evaluation did you apply to your selection system?
Question: Which type of mathematical procedure did you apply for empirical evaluation?
Question: What are the failure rates during different stages of Training?
Question: Describe the composition of your selection team and their tasks.
Question: For which functions are they responsible in the selection process?
Question: In which way did you define the requirement dimensions of your selection system?
Question: Who constructed the selection system?
Question: How is your selection system structured?
Question: Do your candidates get any information about the selection procedure in advance?
Question: Do you accept preparation courses for your selection procedure?
Question: Do you support preparation courses for your selection procedure?
Question: In which state of selection does your selection allow a prognosis concerning suitability for the captain's role?
Question: How do you ensure data protection of the selection results?
Question: Do you allow failed candidates to re-apply?
Question: What are the re-applying criteria?
Question: How are re-applying candidates selected?
Question: Do you adapt the conditions/standards/procedures during periods of high demand of pilots?

3.3 LESSONS LEARNED FROM THE INDUSTRY SURVEY

3.3.1 ACCEPTED APPROACH

The participation rate of the ITQI survey, subsequent feedback from the participants and the ongoing evaluation of the survey results have shown that the categories used to evaluate the issue of pilot selection and the questions which were asked were accepted by the respondents and can be used in the further development and optimization of more standardized selection systems.

3.3.2 SELECTION SYSTEMS MAY DISPLAY A LACK OF CONCEPTUAL BASIS

Very few (13/66) institutions stated that they run a selection concept. Ten organizations have dedicated concepts for different target groups in place. The others also perform selection, but do not refer to their procedures as a concept. This could be an indication, that there is a need for conceptual support in setting up efficient selection systems, which is an intended consequence of this IATA manual. Furthermore, most institutions running a selection system do not offer such services to third parties.

3.3.3 STRENGTHS AND WEAKNESSES – METHODOLOGIES BEING IMPROVED

Organizations who monitor their selection system stated that their programs have changed significantly during recent years. Half would like to make more changes, but are limited by various factors. Changes made and changes desired affect the methodology (reliability, validity and evaluation) but are less focused on the impact on the organizational efficiency (time, costs and automation). A significant challenge is that professional selection systems can only be evaluated and maintained by collecting the necessary data from all parties in the system. Processing this data through the career path of a pilot into a statistically and scientifically accurate format is demanding of time. Consequently, most organizations applying a stable selection system consider their methodical criteria (high reliability, quality of the evaluation procedure and high validity) as strengths, followed secondarily by economics. The weaknesses they identified were, (a) requirements for test-operator qualification, (b) low “degree of automation” and (c) economy in time.

3.3.4 READY-ENTRY PILOTS (LOW EXPERIENCE) ARE A DIVERSE GROUP

Recruiting groups:

The survey grouped applicants into four categories:

(1) Captains,
(2) First Officers,
(3) Ready-Entry (Direct Entry) Pilots with low experience, and
(4) Ab-initio graduates.

The Ready-entry (direct entry) group:

While the industry seems to have a common understanding of what constitutes a captain, a first officer and an ab-initio graduate, the study showed that there are substantial differences in defining and understanding the group entitled, “Ready-Entry with low experience”. Among other criteria, (low) experience was defined by licenses held (CPL/IR or CPL/IR-MPA or instructor ratings over a wide range of flying hours (from 200 to 2,000).

Performance prediction:

Predicting the performance for ready-entry pilots (low experience) is especially difficult because this group is not homogeneous, and neither licenses nor flying hours can reliably describe a pilot's competency. Numerous industry experts agree that from direct observation in extensive instructional and evaluation settings, there is a wide variety of individual performance for any given volume of total flight experience in a log-book; and that total flight experience is not a reliable measure of competence. A structured selection system is therefore vital in removing this ambiguity.

Career performance:

While many 'opinions' abound, only long-term collection of career performance data in sufficient volume will most convincingly expose optimal selection criteria; which demographics work best (age, education, origins, previous employment arena), leading to the highest probability of career success.

3.3.5 SELECTION FOR CAPTAINS AND FIRST OFFICERS UNDERVALUED

Most selection systems have been established for ab-initio candidates and they display a high degree of sophistication. Fewer and less methodically qualified selection systems are in place for first officers, and those selection systems existing for captains display the lowest levels of system maturity and robustness. This may stem from the legacy belief that hours = competence.

Testing applicability from survey:

The survey results suggest questions regarding the applicability of current aptitude testing for first officer and captain candidates. The consequences of reduced aptitude testing during later career phases (this is the case for first officers and captains) could lead to serious challenges for both the operator and the applicant.

Pilot mobility and job changes:

Airline industry movements demonstrate that an increasing number of pilots have in the past, and may even more frequently in the future, change employers. This mobility is on the increase now as Asia and Middle East operators poach pilots from other regions. Among other factors, (economic situation, life style, and health) this will cause interruption and destabilization of personal and professional development.

For operators recruiting from this migratory population of pilots to their fleets, it makes sense to implement more accurate, rigorous, and targeted selection systems, avoiding the assumption that all flight experience adds to the well rounded professional.

Performance predictions:

Every operator seeks to make predictions about the future performance of their staff, such as the future suitability of first officers for a promotion to command. However, long-term predictions regarding the performance of pilots derived from earlier selection processes can only be made optimally when pilots remain in a continuously stable and controlled working environment fostering continuous education, professional development, and regular assessments of job performance. Normally, this situation can only be assumed to exist within mature organizations with positive organizational and safety cultures[4], and well-established career development systems.

[4] See ICAO SMM (Safety Management Manual) doc 9859

4 LEGAL PROVISIONS FOR APTITUDE TESTING

4.1 GENERAL

ICAO: A medical examination, English language proficiency and the ability to comprehend the training course content are all established ICAO requirements, and ICAO also prescribes guidance regarding human performance.

National Regulators and personality criteria: Regulators worldwide have been far more reluctant to develop standards in regard to personality criteria. There are some general requirements for assuring the psychological aptitude of applicants, but there is a serious lack of guidance material. Furthermore, this lack of guidance material creates a problem for the operators and ATOs, which in their own interest, should strive to assure that their future pilots are equipped with all the knowledge, skills and attitudes necessary to perform the job as required. In this context, modern human factor concepts (i.e., Threat and Error Management), manuals such as the ICAO Human Factors Training Manual and ICAO PANS-TRG) and modern crew training concepts (Evidence-Based Training) highlight the need for flight safety driven human performance interventions.

JAA / EASA: Joint Aviation Regulation Flight Crew Licensing 3 (JAR FCL3), Section 2 provides guidance on how to handle reduced psychological capabilities of licensed personnel. Reversely applied, this may also serve as the basic criteria for pre-selection schemes. It is a responsible and appropriate course to encourage regulators to establish requirements for a psychological pre-selection regulatory scheme as soon as possible.

USA: Equal opportunity legislation (e.g., USA Title VII of the Civil Rights Act of 1964 and 1991, monitored by the Equal Opportunity Commission) has been in force for many years. However, very few legal cases against employers have been successfully pursued where the use of standardized psychometric testing was involved.

Discrimination: Inevitably, the selection of suitable candidates during aptitude testing requires separation and sorting of the potential candidates. The criteria and standards must be strictly job relevant and directly related to the required job performance in order to justify the selection and eliminate any form of discrimination. However, some countries have imposed legislation with the potential to affect the collection of biographical data and the questions that may be asked during an interview. In some cases hiring decisions may need to be made in order to maintain certain proportions of ethnic groups or gender. In all cases, special focus must be given to the reliability of the testing procedure. An unreliable testing methodology could lead to a proportionally higher rate of rejected applicants in a certain category, which could be considered unlawful.

4.2 SURVEY

The legal survey part contained four questions concerning requirements, conduct and supervision of selection procedures by the authorities of the concerned state. Except for Language Proficiency (Level 4) requirements, no institution reported any involvement of their authority.

4.3 EXISTING REGULATIONS

ICAO PANS-TRG Doc 9868 Attachment A to chapter 3 No. 3.4 (Population analysis), referring to MPL only; the following sentence could be used to establish national or global requirements: *"Contracting States should define the qualifications, in terms of skills, knowledge and attitudes, required for meeting the entry levels for the course and should ensure that an appropriate corresponding selection method is in place."*

EASA Annex III 1.a.1 to Regulation (EC) No. 216/2008 (Basic regulation) refers to pre-selection of pilots as follows: *"A person undertaking training to fly an aircraft must be sufficiently mature educationally, physically and mentally to acquire and demonstrate the relevant theoretical knowledge and practical skill."* There is no guidance material about details how this can be assured.

CAAC (China)

Additional to "Medical Fitness and Language Proficiency" in CCAR Part 61 (16. Dec 2004) the following requirements apply:

61.103 Eligibility requirements for student pilots
"(*b) Be of good moral character"*
61.153 Eligibility requirements for commercial pilot certificate
"(b) Be of good moral character"
"(d) At least graduate from high school"
61.183 Eligibility requirements for ATPL
"(b) Be of good moral character"
"(d) At least graduate from high school"
In the English version, there is no guidance material.

Note: *A pre-selection requirement for MPL applicants is under development.*

CASA (Australia)

Beside the "Medical Fitness and Language Proficiency" the following applies:
CAR 5.09 Flight crew license issue and refusal:
"(1)(c) is a fit and proper person to hold the license."

FAA (USA)

14 CFR Part 61 requires for commercial pilots the relevant medical examination and to read, speak, write and understand the English language and:
"§ 61.153 (c) Be of good moral character"

DGCA (INDIA)

Civil aviation requirements (CAR) Section 7 Series "B" Flight Crew Standards, Training and Licensing:
1 Introduction:
In general, an applicant for issue of a license should "meet the requirements in respect of Age, Basic Educational Qualification, Medical fitness ..."
§ 7.3 Commercial Pilot The applicant should have
"a) Passed 10 + 2 standard examination with Physics and Mathematics
Subjects from a recognized Board/University or an equivalent examination."

TRANSPORT CANADA

"The flight training unit shall ensure that an applicant, before being admitted to an integrated course, has a secondary school diploma or equivalent in accordance with the personal licensing standards."

4.4 DATA PROTECTION AND PROFESSIONAL STANDARDS

In many areas of the world, legislative framework relating to personal data privacy and protection is in place. For example, the European Union Council Directive 95/46/EC set the requirements for the protection of individuals with regard to the processing of personal data and on the free movement of such data. It is important to be aware that such data also includes the reports that are generated by computers or human testers during aptitude testing.

Outside EU: Testers beyond the legislation of the EU might find it useful to consider the key principles of the directive as it provides a minimum set of requirements to process personal data fairly and lawfully. In any case, data protection is an important issue to be addressed before putting a pilot selection system in place.

Professional Standards: In addition to legal provisions, the society of psychologists has developed professional standards for the development, application and validation of aptitude testing (for example, in the USA, the Society for Industrial and Organizational Psychology and in Great Britain, the British Psychological Society).

Note: *It is strongly suggested that legal counsel is consulted for interpretation and application of the legal requirements concerning aptitude testing of personnel. The authors of this manual are not lawyers and the information given should not be taken as legal advice.*

5 APTITUDE TESTING AND RECRUITMENT / HIRING

5.1 TESTING SUPPORTS RECRUITMENT

The recruitment process usually starts after the flight operations department has decided to look for more crews for a specific aircraft type and operation. The subsequent series of steps require the involvement of several parties within and outside the organization.

Aptitude testing plays the key role in the recruitment process because of its importance for the quality of hired staff. Additionally, a well-structured aptitude testing process requires preparatory work that can educate the organization and produce synergistic effects within the organization with respect to its structure and functionality.

Recruitment comprises of the following steps:

1. Posting advertisement
2. Handling of queries and applications
3. Aptitude testing
4. Evaluation of test results
5. Hiring decision
6. Reception of new staff
7. Initial operating experience training
8. Checkout as crewmember and start of probation period
9. End of probation

The following are key questions in this process:

(a) Who is responsible for the process?
(b) Who defines the requirements?
(c) Who performs the testing?
(d) Who takes the hiring decision?
(e) Is the decision solely based on the results of aptitude testing?
(f) How and by whom is the recruitment process / selection system maintained (evaluated)?

5.2 SCREENING AND SELECTION

In aptitude testing systems, screening is often used at the beginning to eliminate those candidates who send applications without meeting the predefined requirements (it is advisable, however, not to apply too stringent criteria at this stage in order to avoid the premature exclusion of suitable candidates).

Types of Screening: Screening can also be used to identify the best among a group of all qualified applicants. Normally, questionnaires (online, mail or on-site) are used to collect biographical data such as age, family, education, language, knowledge in mathematics, physics and computer skills, interest in sciences, sports, interests, fixations, flying experience and license. This can also apply to the clarification of basic mental abilities (intelligence using psychometric tests, psychomotor abilities and possibly some specific operational competencies for pilots). Reference checks (consultation of former employers) for captains and first officers are also quite common, (this included 31 of 37 responses in the survey). These can be costly and may be more effectively used in the latter stages of the overall process to fulfill legal responsibilities required by some governmental agencies.

Objectivity: It is important, that subjectivity is avoided in this process as it is agreed that unstructured background checks do not add value to a scientific testing process.

References: Consideration should also not be given to reference checks with current employees who have direct knowledge of a potential employee's past performance in the work environment unless such reference checks are formally incorporated in the testing procedure and meet the scientific standards of the test battery.

Selection: Selection refers to the identification of those who meet the requirements best among a group of qualified candidates. This entails a subsequent invitation for an individual to join the company as an employee. Selection occurs later during the process and requires more elaborate testing of qualities such as personality traits and social competencies. Interviews and group exercises are often utilized in this phase. It should be understood that these tests are more costly and their measuring accuracy is lower when compared to screening tests. Moreover, for this reason they should not be accomplished before the screening, or otherwise applicants could inadvertently be excluded who might have excellent mental abilities. Additionally, some social competencies can be improved with training to produce good long-term results.

5.3 MECHANISM: STRUCTURED APTITUDE TESTING AND RECRUITMENT

Organization of tasks and process: A well-organized recruiting process and clear allocation of tasks and responsibilities are key factors to success. These factors are also the precondition for cost transparency. Most operators are able to quantify the cost of certain parts of the recruitment process (usually the testing itself). However, very few seem to know the total cost of hiring programs.

Design and implementation of an aptitude testing system guides the organization toward an effective and transparent flow of activity throughout the recruitment process.

Job requirement definition: A clear definition of the requirement profile is necessary. The requirement profile is based on a job analysis and identifies the dimensions required to perform the job within the company. These are commonly called KSAs (knowledge, skills and attitudes) and personality traits. In order to define the requirement dimensions, methodically sophisticated concepts like scientific requirement analysis, requirement definitions by experts and work samples are more frequently used to define requirement dimensions than those based on personal judgment.

Basic pilot skills: The testing of basic pilot-specific mental abilities should be clearly separated from personality traits, especially those which may be considered company-specific. Basic abilities must be tested first and only successful candidates should move on from these tests to those of personality traits.

Personality traits: Desired personality traits seem to vary considerably between operators (corporate, low cost and non-scheduled charter). Operators often claim that the specific nature of their operation demands that their pilots possess unique personality traits. On closer examination, the differences between organizations diminish in most cases, and can be reduced to a limited number of general criteria.

Tailored selection: It should be determined if the organization desires to tailor the selection system or not. In the survey, half of the institutions claim they have tailored their selection system to their type of operation. The adaptations made involved training contents, such as selection of training devices, operating procedures and safety culture and fewer selection requirements like the ability to work on projects, leadership, appearance and the ability to deal with complex problems.

Combined requirements:

The variety of requirements dictate that the definition of the requirement profile ideally be a combined task of human resource departments, flight operations and training departments. Senior personnel of these departments are able to identify both the success and the potential problem areas that the company has experienced with its existing group of pilots.

Biographical data:

The profile is normally extended by biographical data (i.e., age, sex, nationality, language, licensing, education, school degree, hobbies, sports, family, interests, etc.).

Definition of target groups:

Once the requirement profile is defined, the target groups can be easily identified. IATA recommends that the structure of target groups by experience level be defined by the following categories of applicant:

- **Ab-initio cadets** – beginners who join an operator-sponsored or self-sponsored, supervised approved training course in an approved training organization (e.g., MPL course or ATP integrated course)
- **Ready-entry pilots** – this group (often referred to as 'Direct-Entry') shows various levels of experience. CPL/IR-MPA or MPL license holders with less than 1,000 hours, or with less than 500 hours on a MPA are considered as Ready Entry Pilots with low experience.
- **First officers** – type rated with more than 500 hours on MPA
- **Captains** – type rated with successful completion of an operator commander course

Note: Operators may adapt the suggested definitions to their specific requirements.

Additional criteria:

Additional target group characteristics like gender, age, language, nationality, school level and marks, flying hours, etc. may be added.

Documentation:

The recruitment process requires documentation.

Responsibilities within process:

Having defined the requirements and having identified the target groups the next step is to allocate responsibilities within the organization for the various tasks.

Types of tests:

The testing process itself can thereafter be designed by identifying the types of tests to be included in the selection system. Since there are different testing methodologies available, it is essential to choose adequate tests for each specific step. A closer look at the pros and cons of various test batteries (sequence or set of tests) unveils widespread common errors, especially regarding the issues of who should conduct the testing and which methodologies are most effective (see Section 8 – Construction of Pilot selection systems).

5.4 CULTURAL DIVERSITY

Since most known aptitude testing systems have been developed by western organizations, it is advisable to use caution and careful research when applying them to other cultures. The fact that aviation is a global industry is particularly important to the consideration of cultural diversity issues. While a flight deck may be to a global standard, those occupying it will have different innate perspectives requiring understanding in selection.

Most of the participating institutions stated in the survey that they recruit foreign nationals and are not hindered by official restrictions. Two thirds of these respondents addressed cultural diversity in their selection systems. Those who made adaptations consider their organizational and practical needs of group performance and needs of the training department. Most of these organizations do not tailor their recruitment campaigns to specific target groups. The selection systems cater to specific target groups and making adaptations primarily to the measuring dimensions, application criteria and number of tests.

5.5 HIRING DECISION

Scoring / Assessments:

Psychologists use statistical methods to value the importance of different tests while combining the scores from those tests (e.g. regression analysis). Normally, the end-result is then presented as a profile of the applicant to the decision-maker. Note that simple pass/fail information, scale values or rank rows are less informative. A differentiated profile supports the organization when designing post-hiring training measures. During times of high demand, this may also enable an organization to accept candidates with deficits, which can be cured later during training. The profile can be seen as a prediction of how well the applicant is expected to perform on the job.

Team Decision:

In most cases, the hiring decision is made as a group by the designated airline selection team. Assuming that the selection system was based on a thorough definition of requirements, the hiring decision can be based primarily on the testing results. Other factors such as administrative aspects, availability of applicants, legal aspects and flying experience should be incorporated in the definition of requirements and are therefore covered by the screening process.

Advising candidate of failure:

There are numerous ways to present failure decisions to the applicant. Many operators are reluctant regarding disclosure of test results and provide purely pass/fail information. Others offer feedback or explanations during a final discussion with the applicant or after a certain waiting period. Only a few provide a sound survey of the measured profile to the applicant or verbally discuss in detail the applicant's strengths and weaknesses. There is a general perception that this issue should be handled in a more fair, adequate and supportive manner.

6 PREDICTING PERFORMANCE OF PILOTS

A reasonable predictor:

Aptitude testing systems are not "perfect" in predicting the future performance of pilots. However, if they are developed and designed responsibly, they can offer valuable guidance to the operator. There is consensus amongst experts in the field of aptitude testing that performance of pilots can be reasonable well predicted by means of testing. Opinions differ on a) how long the predictions are valid, b) which category of performance can be predicted best and c) how detailed the prediction can be.

Prognosis and age:

Success during training can be predicted quite well over a time of two-three years. Prognoses for applicants of ages 30-50 are generally more reliable than for those of ages 18-30 because younger people are more frequently exposed to changes in life than older ones. Performance can be predicted more accurately than personality traits.

Test quality:

There is consensus that predictions depend on the quality of tests and feedback data for its evaluation. Without developing a specific, statistical formula, the following criteria describe the principles of effective testing which best determine the quality of its predictions.

6.1 TEST RELIABILITY

In aptitude testing, the accuracy and consistency of the measurement characteristic of a test is called reliability. When interpreting test scores, we need to know how well they differentiate the given levels of abilities of various candidates and the different levels of ability of one candidate in different measuring dimensions.

Reliability coefficient:

Test reliability is expressed in terms of a reliability coefficient. The reliability coefficient provides an estimate of the precision of measurement of a test. The higher the reliability coefficient, the smaller the margin of error around a test score will be. Common methods of determining reliability are:

Test/re-test reliability:

The comparison of test results of the same group, which takes the same test again after a certain time. This method provides information about the stability of the test.

***Alternate form reliability*:**

If several forms of a test exist that claim to measure the same ability then, the reliability coefficient can be obtained by comparing the results of the same group of individuals taking different tests.

Internal consistency:

If, for example, the results of a test from one group are split into two halves by taking the individual scores on all odd-numbered questions and the scores of all even-numbered questions, then the internal consistency can be measured by correlating the two halves.

Alternate forms reliability:

Tests may exist in several versions or alternate forms. Scores from different forms that measure the same dimensions are correlated.

Observer consistency:

Low levels of inter-rater consistency (scores of different observers) indicate that the observation results may be unreliable.

Criterion reliability:

The question whether the criterion (purpose of the testing procedure) is measured correctly. Reliability coefficients are group-specific. If a test has an acceptable reliability for ab-initio candidates, then it may not be reliable for captains. The margin of error can be expressed using a statistic called standard error of measurement.

6.2 TEST VALIDITY

Validity is the most important prerequisite of a good test. Validity of a test expresses the extent to which it actually measures what it has been designed to measure. Typically, validity is presented as a correlation coefficient between measuring dimensions used in tests and job performance criteria. Similar to the concept of reliability, validity can be expressed by three primary methods:

a) **Content (or logical) validity** shows whether the test items are representative of the domain to be measured. For example, a test containing only items to measure the number of words in a sentence would have poor content validity if the purpose was to measure general communication skills.

b) **Concurrent validity** refers to the relationship between test scores and another criterion at the same time. For example, a measure of intelligence might correlate with the performance during the type rating ground course.

c) **Predictive validity or criterion validity** refers to the relationship between test scores (scientifically called “predictors”) and a measure of job performance at some later time. Predictive validity plays the most important role where tests are used to predict the future performance of pilots. For example, it might be interesting to study the predictive validity of a test which measures the ability of ab-initio cadets to manage workload with respect to their later success during initial operating experience (IOE) training. In this case, the first test results are already collected before the beginning of their licensing training and then two years later relating to a second set of measurements of their job performance during and after completion of the IOE.

   Predictive validity tracking: Predictive validity should be tracked over time. Various reasons (pool of applicants has changed, training system is outdated, new a/c type requires different skills and outdated tests) could lead to a decrease, which indicates that the system needs maintenance. Furthermore, keeping track of the predictive validity of a selection system is necessary to control its cost effectiveness.

   Job performance criteria: Predictive reliability requires reliable criteria of job performance and data from a reasonably large sample of pilots. The problem is that in many cases there are no standardized performance criteria available. The various stages of training (flight school, type rating training, line training/IOE) are performed by different entities which work with different scales and different performance criteria to measure (grade) pilots’ performance.

Performance measurement: There is a wide variety of grading systems in service, including verbal descriptions of performance, behaviors, digital pass/fail decisions, rank rows, scientific scales and qualitative classifications of performance (most of them are connected with obligatory consequences for the trainee). Additionally, during the various career steps of a pilot he/she may face different performance criteria and measuring scales. Many commercial flight schools measure the performance of cadets very differently from type-rating organizations or operators during IOE, line-checks or upgrading training. The various measuring scales make it difficult to track and compare performance data throughout the pilot's career. However, such a coordinated feedback process is necessary to measure predictive validity of aptitude tests. It is assumed that only a few current operators are actually capable of providing this environment in an ideal way. This manual shall serve to encourage involved parties to establish close connections between aptitude testing systems, flying training and line operations to ensure a functioning quality assurance process.

A global standard under development: ITQI and other initiatives like the ICAO FCLPT (Flight Crew Licensing and Training Panel) have produced agreed terms of performance criteria which can be applied by the industry worldwide and may facilitate data-driven training innovation.

The new MPL (Multi-Crew Pilot License) training system especially requires a competency-based training scheme which is only possible by a continuous, data-driven quality monitoring, which must be based on the measurement of well-defined performance criteria throughout the entire training including IOE.

d) **Factorial validity/construct validity** is established through factor analysis. Factor analysis is a set of mathematical procedures for analyzing the interrelationships among variables in a test

.

6.3 NORM

Knowing that a candidate has reached a score of 70% is quite meaningless without a NORM. At best, it can only serve to provide a ranking among the tested group.

However the following questions still remain:

- Which level of performance can this score predict today or in the future?
- How does this compare with others? – Is the result "normal"?

The NORM demonstrates the following:

- Which level of performance on the job can be predicted by this score
- The value of this score in relation to other persons in other groups
- Which measuring quality can be derived from this score and which scientific mathematical operation can be performed with the score (i.e., overall score in conjunction with other tests)

Comparison: Norms are necessary to enable objective interpretation, rating, and grading of test results. Norms are preconditions for meaningful pass/fail decisions. By comparing the candidate's performance with the norm, we can determine how far the candidate's performance is above or below the performance of the comparison group. The choice of the norm is crucial and the comparison group should be consistent of people who have applied for the same or similar jobs in the industry.

For example, comparing the performance of ab-initio cadets in their initial type rating skill test with the skill test results of first officers transitioning from a short-haul type to a long-haul type, or with first officers being upgraded to captains on the same type, could lead to very different conclusions, easily misinterpreted.

6.4 MEASUREMENT SCALES

Scales are useful to express results of performance measurements in a numeric way (scales/grades). At least three grades are needed. Yes/no or pass/fail classifications are not scales and are not helpful for further use, such as in recommending training requirements. Meaningful mathematical analysis can be applied to scales.

The most common scale attributes include:

a) Scales which **distinguish between rankings** (percentage, Stanine-values) produce ranks among applicants, which allow clarification on who is better than someone else, but not how much better. Differences between two ranks can vary (e.g., performance difference between score 2 and 3 is not the same as between score 5 and 6) and this makes mathematical processing difficult (e.g., to produce an overall score among different measuring dimensions). Therefore, profiles are used instead.

b) Scales with **fixed intervals** (T-values, IQ-values) – these scales allow mathematical processing such as overall scores.

It is helpful to construct scales so they **express results in a useful way**, such as:

- **Unsatisfactory**
- **Eligible**
- **Satisfactory**
- **Qualified**
- **Highly-qualified**

7 MEASURING DIMENSIONS / TESTING INSTRUMENTS

Requirement engineering:

A number of different selection instruments (tests) can be applied to pilot aptitude testing. Each type of test has its own strengths and weaknesses. Tests must allow judgment of performance criteria based on sound requirement engineering. Judgment, which is quantitatively differentiated and refers to a defined scale, is called measurement. Requirement engineering can be understood as translating descriptions of performed tasks (job descriptions) into psychological categories of personal requirements that are necessary to perform the job. These categories serve as a basis to construct valid psychological tests.

Phases of aptitude testing are utilized for all phases of a pilot's career:

a) When applying as ab-initio cadet
b) When applying for certain training (i.e., type rating training)
c) When applying for a promotion (i.e., for a captain position)
d) When applying for a job as first officer or captain

Common process:

The following measuring dimensions represent a sample of what is common in pilot aptitude testing. These are not equally applied to all four different groups of pilots (ab-initio, ready entry pilots, first officers and captains).

Ab-initio cadets & captains: Ab-initio cadets usually experience the most comprehensive test program while captains receive the least. However, it is not that simple, as the test program is usually adapted to the respective group. Ab-initio cadets, for example, cannot be expected to have aviation-specific technical knowledge. However, they must possess a good foundation of academic qualifications such as physics in order to acquire knowledge during their later training and career. In a similar way, this applies to some social competencies such as leadership and team play.

Knowledge & social competency: Captains need to show professional aviation knowledge and should be strong in the social competencies needed to practice good Threat and Error Management (TEM) and Crew Resource Management (CRM). Some may have particularly strong instructional and/or managerial skills. Ready-entry pilots or first officers need to be flexible with the ability to adapt to new environments, challenges and policies.

Basic mental abilities are vital, playing a constant and crucial role for all groups because they are necessary for each individual to cope with changes in his/her working environment (upgrading, type-conversions, new procedures, etc.).

7.1 MEASURING DIMENSIONS OF PILOT APTITUDE TESTING

a) Basic Mental Abilities

- ↗ logic abilities
- ↗ memory capacity (terms, numbers and symbols)
- ↗ serial learning (mental transformation of verbal instructions into sequences of actions, during an interaction with a complex system)
- ↗ spatial orientation (2-dimensional, static)
- ↗ spatial transformation (3-dimensional, static)
- ↗ speed and accuracy of perception and information
- ↗ visual processing
- ↗ accuracy and speed of perception and information

- acoustic procession, including dichotic listening
- long-term concentration (level and course)
- technical comprehension

The particular job requirements for pilots can be characterized by the dynamics caused by motion, time, content and complexity of the task to be performed. The ability to master these requirements is called "Operational competency". Operational competencies should be tested in addition to basic mental abilities because they do not necessarily show a high correlation ratio.

b) Operational Competencies (i.e., the most intelligent candidates are not always most suitable for the operational challenges of the job). Operational competencies comprise the abilities to perform the following:

Psychomotor tasks:

- Compensatory tracking
- Pursuit tracking
- Multitasking
- Spatial orientation (3-dimesional, dynamically)
- Movement anticipation
- Information processing

Strategic competencies:

- Prevention
- Minimizing risk
- Compensatory strategies
- Dealing with ambiguity
- Management competencies:
  - Planning
  - Organization
  - Prioritization
  - Decision-making
- Problem-solving
  - Collection of information
  - Derivation of hypotheses
  - Hypotheses checks
  - Derivation of task concepts

c) Social competencies:

Communication skills (non verbal/paraverbal/verbal)
Cooperation
Assertiveness
Leadership competencies

d) Personality traits

Self discipline
Self-critical attitudes
Stress management
Self organization
Professional aspiration level

e) Professional competencies

Regulations
Procedures
Technical knowledge

Note: *Recent IATA and ICAO projects have identified a consolidated set of operational. The categories used are related to Threat and Error Management (TEM) – Countermeasures.*

These are defined as application of procedures, communication, situation awareness, leadership and teamwork, workload management, problem solving and decision-making, aircraft trajectory management.

7.2 TESTING INSTRUMENTS

7.2.1 QUESTIONNAIRES

Questionnaires are the most used instruments. They are perfectly suitable to collect facts such as biographical data. They are not very suitable when testing for psychological criteria.

The following are examples of relevant biographical data:

- School and university grades
- English language proficiency
- Mathematics and physics
- Computer skills
- Interest in sciences
- General education (cultures, history, politics and languages)
- Sports
- Interests in travelling
- Interests in leisure activities to compensate for stress
- Fanatic fixation about flying

Biographical data evaluation is a cost effective way of screening. Successful candidates from this stage are basically qualified for all of those professions which require a defined set of academic prerequisites; however, they need to be tested further for their pilot-specific aptitude. Screenings based on biographical data are used to assure that only qualified candidates are led towards the later and more costly stages of selection.

7.2.2 FREE-STYLE INTERVIEWS

Expert ratings acquired from free-style interviews are commonly used, but are very subjective and methodically weak. They are not suitable for measuring aptitude. They are also not suitable for selection or the elimination of the weakest candidates. If used at all, then they may be used to introduce people to each other but should not be particularly relevant for making decisions in the screening or selection process. Due to the lack of standardization in free-style interviews, each applicant usually faces a different scenario and comparisons between applicants are very difficult to make. By using a rating system at least the systematic aspect of observation can be improved. Holistic judgments of experienced experts, based on freestyle interviews, can sometimes produce surprisingly high hit rates; however, this fact can only be determined by evaluating the results after a certain amount of time (years). When a new person takes over the job, continuity is not assured and the new person cannot build on the previous experience.

7.2.3 SEMI-STANDARDIZED INTERVIEWS

Semi-standardized interviews follow a prescribed set of questions and evaluation criteria. They are quite demanding for the test operator. Provided that the interviewer applies professional questioning and communication techniques, semi-standardized interviews can be successful in capturing personality traits and social competence.

7.2.4 TARGETED SELECTION

In a targeted selection system the interviewer is to collect job-related behavior from an applicant's past history. Interviewers are trained to focus their interview skills and selection decisions on standardized interview principles. Performance is rated by interviewers by applied scores from defined scales (Underlying requirement dimensions can be developed by an empirical process using expert knowledge and in this case reflects the desired company culture)

7.2.5 PAPER-PENCIL PSYCHOMETRIC TESTS

Paper-pencil testing has been commonly used and is qualified to evaluate basic mental abilities (i.e., intelligence). These tests can play an important role in the screening process. They are usually performed with large groups of applicants but the evaluation is time consuming. Paper-pencil tests have normally been replaced by PC based testing.

7.2.6 PC-BASED PSYCHOMETRIC TESTS

PC-based psychometric tests require some IT infrastructure and can be web-based. Similar to paper-pencil psychometric tests, they are reliable and very cost-efficient for testing basic mental abilities.

7.2.7 WORK SAMPLES

The principle of a work sample is to create a task typical of the job to be performed, then observe the results and provide feedback. Work samples are typically used when screening applicants in the airplane (military) or when testing licensed pilots in a flight simulator. The value of work samples is highly dependent on the standardization of the exercises and the quality of observation personnel. If performed by well-trained and experienced experts, work samples can be of good value because of their realistic content.

7.2.8 SIMULATION-BASED TESTING OF OPERATIONAL COMPETENCIES

Simulation-based testing of operational competencies can combine realism of work samples with the advantages of psychometric testing. This form of testing addresses the ability of pilots to solve complex tasks in dynamic environments. Such scenarios are more realistic and comprise interactions of multiple requirements, which must be controlled by pursuing certain (professional) strategies. They require not only rational performance (strategies), but also include emotional (fears and fun) and motivational (confidence and commitment) aspects. Testing scenarios are quite complex and tend to be less rigid then psychometric testing. They also can capture the ability of problem-solving in unstructured situations (unexpected emergency situations which cannot be drilled by procedures). Simulation-based testing of operational competencies can be performed on specifically programed (PC-based) low fidelity simulators. They provide high values of predictive validity[5].

7.2.9 FIXED-BASE SIMULATORS

Fixed-Base Simulators (FBS) are used to provide testing in work sample scenarios. Their value depends on the standardization of the exercises and the expertise of the observation personnel.

[5] Braun, GAPF Wuerzburg

7.2.10 FULL-FLIGHT SIMULATORS

Assessments in Full-Flight Simulators (FFS) seem, at first sight, to be ideal because they offer the highest degree of realism, by reproducing the actual dynamics and complexity of the pilots working environment. Flight Checks in full-flight simulators are commonly used to test flying skills of ready entry pilots, first officers and captains and are valuable tools to complement, but not to replace aptitude testing.

Note: *From a diagnostic point of view, work samples in full-flight simulators are quite demanding (standardization of the scenarios, disturbances, quality of observation, complexity of instruction, inter-rater reliability, etc.). Simple arrangements do not necessarily produce the kind and quality of data, required for valid aptitude testing purposes and are therefore not advised as replacements for classic means of aptitude testing.*

7.3 MOTIVATION OF APPLICANTS

For reasons previously outlined, candidate motivation on entry is probably more important today than previously. Besides satisfying content and methodology, criteria tests should also be easy to use. Active pilots should be motivated to show their full potential during the tests. This can be achieved by constructing tasks which are perceived as being the following:

- ↗ Relevant to the job
- ↗ Low degree of difficulty to minimize disappointment
- ↗ Fair with respect to the framing conditions

Instruction must be understandable and should challenge performance adequate to the measuring dimensions. Some motivational screening tests with strong success rates are available today. By design, the best of these ensure that rehearsed answers will not be successful.

7.4 IATA MATRIX – PILOT APTITUDE TESTING

A complete test battery consists of at least the following components, which are arranged in the given order:

- ↗ Screening (formal requirements)
- ↗ Tests of basic mental abilities
- ↗ Tests of operational competencies
- ↗ Tests of social competencies
- ↗ Half-standardized interviews to capture relevant personality traits

Matrix 1

Matrix 1 proposes one possible method to allocate measuring dimensions and instruments to the four target groups – other solutions are possible.

<table>
<tr><th>Measuring Dimensions</th><th>Instruments</th><th>Ab-initio</th><th>Ready Entry</th><th>First Officer</th><th>Captain</th></tr>
<tr><td>Screening

Biographical Data</td><td>Questionnaire
Interview
Documents</td><td>Biographical and career data:
School degree
School marks
Professional education documents</td><td colspan="3">Additionally:
Flying hours
License
Type ratings</td></tr>
<tr><td>Basic mental</td><td>Psychometric</td><td colspan="2">Memory capacity</td><td colspan="2">Logic abilities</td></tr>
</table>

Measuring Dimensions	Instruments	Ab-initio	Ready Entry	First Officer	Captain
abilities	Paper-pencil tests PC-based psychometric tests	Speed and accuracy of information processing (perception, classification, transformation) Spatial abilities (static) Technical comprehension Reasoning (information processing with basic figures) Logic abilities Long term concentration		Long term concentration	
Composite mental abilities	Paper-pencil tests Psychometric apparatus tests PC-based psychometric tests	Allocation of attention Multi-tasking (different skills combined) Psycho motor abilities (pursuit tracking; compensatory tracking) Spatial abilities (dynamic)		Attention Allocation Multi-tasking (different skills combined) Situation awareness	Situation awareness
Pilot specific operational competences	Paper-pencil tests PC-based psychometric tests Simulator based tests / work samples; Psychometric tests for operational competences	Decision-making Prioritizing Organization Planning Management Problem solving			
Social-interactional competences	Semi-standardized interviews Group scenarios	Verbal, paraverbal, non-verbal skills Language abilities Cooperation skills Assertiveness			Cooperation skills Assertiveness Conflict prevention and solution Cooperative problem-solving Leadership
Personality traits	Semi-standardized interviews	Basic professional motivation Stress – coping with social confrontation Stress – coping with information load Stress – coping with time pressure Self-discipline Self-criticism Captains additionally: Safety motivation			

Matrix 2

Matrix 2 shows in addition, a sample set of appropriate measuring scales.

Phases	Measuring Dimensions	Target Group	Instrument	Scales
Screening	Age, education type and level, grades, flying hours etc.	All	Check	Yes/No
	Knowledge: Mathematics, Physics, English language skills	*Ab-initio*, Ready Entry	School grades	Rank Rows
Test of basic mental abilities	See matrix above	*Ab-initio*, Ready Entry, FO; Captains (long-term concentration)	Work sample (simulation-based) or Psychometrics test (PC)	T-Values, IQ, Centile
Tests of operational competencies	See matrix above	*Ab-initio*, Ready Entry, FO	Low Fidelity Simulator (PC)	T-Values, Rank rows
Test of social competencies	See matrix above	All	Group tests by means of work samples inconnection with rating system	Rank rows, qualitative discrimination
Test personality traits	See matrix above	All	Half-standardized interview in connection with rating system	Rank rows, qualitative discrimination

8 DESIGNING PILOT APTITUDE TESTING SYSTEMS

Defining organizational need:

Designing an effective pilot aptitude testing system is a complex task with numerous considerations. It is not possible to cover all aspects in their entirety within this manual. The intention of the content is to examine several crucial aspects of the process. The most important starting point is to define the actual needs of your organization. Defining your needs determines what the selection system used shall deliver, called the criterion. Some examples could be the reduction of failure rates during type rating training, an improvement of service mindedness, cost reductions, less staff turnover, assurance of a certain level of quality, etc. If there is no identified issue(s), the organization may not need to install an additional system. Sometimes simple aptitude testing procedures developed at the early development of the organization (sometimes called casual selection systems) have become recognized for their ineffectiveness, and the need for upgrading is understood.

Job analysis:

Job analysis involves two steps. First, the purpose of the job needs to be established (why the job is needed in the market and what function it serves). This step is called "*Job description*". It must not be confused with the second step, which clarifies what kinds of abilities the applicants should possess to be able to perform the job well. These are called "*personal requirements*" and sometimes also called "*job requirements*". Job analysis with job description and personal requirements are important because they require a detailed analysis of the organization's objectives, company values and future challenges. This task requires significant management input.

It is important to establish a scientifically detailed definition of the essential employee qualities necessary for excellence in job performance. Besides basic general abilities, professional abilities and certain personality traits (sometimes operator specific) will be preferred.

System goals:

Once these prerequisites are established the organization can move toward building and maintaining an efficient and effective aptitude testing system capable of achieving the following goals:

- ↗ Identifying the most suitable staff for the job
- ↗ Delivering selected personnel at lowest possible cost
- ↗ Providing a fair and legally defensible architecture

8.1 ELEMENTS OF A PILOT APTITUDE TESTING SYSTEM

To achieve the goal of improving staff performance, either during training or during operations, the testing system must contain certain elements which need to be arranged in a sequential order to function effectively. This is referred to as a "*structured*" testing system including elements of which are tabled:

Key question	***Required action***
What is our problem / goal?	Define the criterion(criteria) which shall be achieved by the Aptitude Testing System
What do we want to measure (test)?	Perform Job Analysis. "Translate" job/personal requirements and performance criteria which constitute the desired good work into scientific psychological terms (KSAs – Knowledge, Skills, Abilities/Attitudes and personality traits) which can be measured by psychological tests.
How do we measure? Which tests serve us best?	Decide about the test battery (set of tests/measuring instruments) and their sequence. Decide on the selection team members.
How do we get from test results to a hiring decision?	Combine all test scores (profile). Define cut-off criteria, decide at which stages to exclude applicants and decide when and by whom the hiring decision is taken.
How can we validate our selection system?	Construct the evaluation system by implementing data feedback process from training/ operation back to the selection team, assure supporting IT environment to enable data management.

Note: *The described process should be documented carefully for several reasons. First, selection is a part of the recruitment process and should be included in the quality assurance documentation of the company. Second, construction, implementation and maintenance of the selection system itself are facilitated by good documentation. Third, the documentation may be required for proving the fairness of the system against legal claims.*

8.2 TEST CRITERION

Performance and predictability:

The underlying purpose of an effective selection system is to assure or improve the level of performance of employees, and predict how well applicants will be able to perform in the company. Performance measures serve as criteria for the selection system. Good performance and airmanship is not sufficient to serve as a criterion. Useful performance measures include data like the time needed to complete certain training elements, scores of theory tests, check flights, simulator assessments, ability to follow the standard footprint of the type rating training, hours or sectors needed to complete initial line training (i.e., IOE), upgrading assessments for first officers, etc.

Measurement scales:

Digital measuring scales like pass/fail are often used but not very helpful. Scales should be carefully developed and the achievable performance levels must contain qualitative descriptions. Performance criteria for measuring pilot performance during training should coincide with the criteria used in the operation. This is usually seen if the training institution is closely connected to an associated airline (for MPL, this is a regulatory requirement).

Note: *ICAO PANS-TRG, Doc 9868, contains detailed guidance material for the MPL and emphasizes the Threat and Error Management (TEM) concept as a master competency for a safe, effective and efficient operation. Non-technical and technical countermeasures against threats and errors are identified, categorized and described by performance criteria. Organizations looking for an appropriate set of criteria should make use of this well-developed concept.*

8.3 PERSONALITY REQUIREMENTS

Personality requirements must begin with a job/task analysis and finally lead to a list of required KSAs (knowledge, skills and attitudes) and personality traits of potentially successful pilots. When asked to define required personality traits, flight operations managers initially tend to be convinced that their distinctive corporate identity and the special character of their operation require specific personality traits from their pilots. Therefore, this task appears to be elaborate. When examined in a more scientific way, commonalities amongst operators are often found and differences in personality traits may diminish or be reduced to very few unique criteria. These are commonly related to special services (VIP flights, etc.), route structure (very short sectors, no layovers, etc.) and aircraft type (low/high degree of automation, etc.). Aviation psychologists and human factors experts can assist to clarify issues regarding personality traits. It may also be important to incorporate knowledge about the characteristics of the labor pool from which the applicants can be drawn into the definition process.

Note: *Requirements during training in flight schools are not exactly the same as those during later routine flying duty. Extensive theoretical knowledge instruction as well as single-pilot operation in small training aircraft, demands different skills during certain phases compared to handling large complex aircraft in a multi-crew environment. In a comparison of ab-initio students with active line pilots, an European study[6] found the general job perception of selected cadets and active line pilots to be the same, (showing that the cadets already had a realistic job concept) whereas particularly the social/interactive demands for line pilots were higher. The study used a modified version of the Fleischmann Job Analysis Survey (F-JAS) which provides a comprehensive set of requirement scales.*

Instead of creating and conducting the job analysis internally (which may be impossible for smaller organizations) this process can be shortened. An operator can either build on an existing task analysis which had already been performed to participate in other programs to raise effectiveness of training or flight operation like AQP; or use task analyzes and definitions of job requirements available from other airlines, institutes or organizations (selection providers) which can be modified or directly applied. An aviation psychologist will be able to match the demand of the operator with defined traits and translate the agreed set of requirements into psychological items which then become measurable by tests.

8.4 TEST BATTERY

Aviation psychologists are familiar with selecting appropriate tests and assembling the test battery[7]. This is needed to assess the KSAs and personality traits necessary to meet the defined performance criteria. Often, several tests are available for testing one certain element of the KSAs or a personality trait. It is recommended to base the decision of the test selection on its reliability, predictive validity and time/cost effectiveness (in terms of time/cost per applicant). Additionally, the combination and sequence of tests should be determined. It would be illogical and inefficient to begin with a test of less importance, lowest measuring accuracy or using scales which differentiate purely. This could lead to unwanted early exclusion of suitable applicants.

For the first two stages of selection (basic mental abilities and operational competencies) psychometric tests are best. They are reliable, valid and can be used to assure that applicants possess all required abilities.

[6] P. MASCHKE and K.-M. GOETERS, Deutsches Institut für Luft- und Raumfahrt e.V. 1999
[7] Test battery definition: a set of aptitude tests/selection instruments

Applicants who do not reach required scores should be excluded at this stage (experience shows that these are 30%-50%) since it is unlikely that they will perform sufficiently during the subsequent more complex and pilot-specific tests.

Testing required experienced rating personnel and/or experts (social competencies and personality traits) should be administered thereafter (measuring accuracy of these tests is lower compared to psychometric tests).

At this point, it is worth spending adequate time on planning. As the selection system is a part of the recruitment process, the sequence of steps should also be arranged in an economically reasonable order.

Several arrangements are possible, depending on time and cost for housing, transportation of applicants, test personnel and equipment. Two possible options are listed below.

8.5 ARRANGEMENT OF STAGES

Screening must precede the selection phase.

Single-Stage Selection Procedure

1	Screening
2	***Selection***
2	Hiring decision

Multi Stage Procedure

In this table selection is performed in two stages.

1	Screening
2A	***Stage 1 – Selection tests***
2B	***Stage 2 – Selection tests***
3	Hiring Decision

Multi-stage selection procedures are advisable because they offer the possibility to reduce costs per applicant. To achieve this, the less expensive tests are conducted first. Only successful candidates from Stage 2A are allowed to continue to Stage 2B – which is more expensive.

Multiple stage testing can be separated by time (i.e., if evaluation of the results is time consuming) and/or location (i.e., parts of the test battery are installed at a fixed location and other tests can be administered close to the home of the applicants or are available as online tests). However, depending on the required time and test arrangements, both stages can also be processed on the same day.

8.6 CONTENT OF STAGES

This table shows a typical arrangement of tests and stages:

Stage 1 Screening	Screening based on biographical data. Normally *questionnaires* (online, mail or on-site) are used to collect biographical data such as age, family, education, language, mathematics and physics, computer skills, interest in sciences, sports, interests, fixations, flying experience and license.
Stage 2A Selection/screening	Basic Mental abilities (intelligence – psychometric tests) Psychomotor abilities Specific operational competencies for pilots
Stage 2B Selection	Social competencies Personality traits
Stage 2C Flight simulator testing (Ready Entry, FO, CPT only)	Assessment of flying skills and determination of required training.
Stage 3	Hiring decision

Note:

Full Flight Simulators (FFS) seem ideal selection devices as they offer the highest degree of realism and are commonly used to test ready entry pilots, first officers and captains. They are valuable to assess type specific flying skills and to determine training measures needed to integrate newly hired staff into the organization, as well as validating previous experience data provided.

However, from a scientific perspective, the prediction of future performance may be difficult to assess in full flight simulators, because these devices do not produce the extent and quality of data needed for such diagnostics.

FFS are normally not used to assess ab-initio cadets or read entry pilots with very low experience because of the high effort of instruction and pre-exercising that would be necessary before the assessment. Additionally, difficulty would arise in clearly measuring performance in the desired test-relevant measuring dimensions and avoid measuring the ability to comprehend the given simulator instruction.

Competency-based pilot training courses, especially the MPL course, combine multi-stage selection procedures with continuous/progressive assessment of pilots' performance during the initial career.

This table shows one possible selecting process for an MPL course:

Stage 1	Screening
Stage 2A	*Screening/selection tests*
Stage 2B	*Selection tests*
Stage 3	Preliminary hiring decision
Stage 4	Approved MPL course including Type rating training IOE (Initial Operating Experience) Continuous assessment/tracking of the development of defined competencies
Stage 5	Probation period
Stage 6	Final hiring decision

Note: During MPL courses, the final hiring confirmation decision is normally taken after the successful completion of the course at the end of the IOE phase. In this case, 15 to 18 months are available to continuously assess the performance of cadets/pilots.

Competency-based training, including subsequent course evaluation process, requires that continuous on-the-job performance data is recorded throughout an entire career. This data must be fed back into the selection system to assure that the selection system continues to be able to validate the tests, allowing continuous improvement of the selection system. Data-rich selection systems are capable of coping with even small pools of applicants.

9 ADMINISTRATION OF APTITUDE TESTING SYSTEMS

Normally, the flight operations department, flight-training department or human resources department is responsible for the set-up of a new aptitude testing system. Besides developing the content, organizational factors and maintenance issues need to be considered.

9.1 SELECTION TEAM

Developing, installing and running an aptitude testing system should be facilitated from the very beginning in close cooperation between the departments involved (operations, training, human resources and testing agency/consultant). Ideally, the selection team consists of a combination of psychological, methodical, statistical and flight operation expertise. It may also be considered appropriate to involve a qualified pilot representative (experienced captain) either from active line operations, or recently retired, to ensure the most thorough and informed involvement from the line operations perspective.

Sequence of tasks / tests:

Numerous tasks need to be accomplished during the testing procedure. At first, there are administrative tasks like organizing the test procedure and data management/IT. This can be accomplished by a recruitment manager within the HR department. Depending on the nature of the tests, they can be administered by trained personnel or require scientific experts. For example, semi-standardized interviews and simple monitoring duties during automated tests can be accomplished by trained experts. Flight simulator work samples require specifically trained flight operation experts. Group exercises are very demanding for the observer because of their complexity and dynamics and require a psychologist/trained consultant. Involvement of a qualified aviation psychologist or a qualified aviation human factors expert is essential to the interpretation of all data and to the maintenance (evaluation) of the selection system. Most organizations have formalized procedures in place to identify members for the selection team. The selection team members should receive appropriate initial and recurrent training for their duties.

9.2 DURATION OF TESTS

For each stage, six to eight hours of testing per day is acceptable. More time would lead to tiredness and the candidates and their tests would not properly measure the intended dimensions. After a maximum of two hours, a 10-15 minute break should be granted. These breaks are effective in relieving stress and fears which could escalate and impair performance.

9.3 OUTSOURCING / ACQUISITION OF TESTS

Insource or outsource:

Most organizations that participated in the survey perform their own testing internally and few of them cooperate with other institutions. However, outsourcing aptitude testing to an experienced partner (e.g., another airline, testing institute or consultant) is clearly an option to be considered by smaller operators. When testing only 10-30 applicants per year, internal testing is inefficient and evaluation of the test battery is time consuming. When serving 100 or more applicants per year, internal installations make more economical sense.

In the event of taking over a series of tests from other entities, it is essential to align the implied approach (job requirements, measuring dimensions, performance criteria, grading scales, weighting and proper sequencing of the different tests, etc.) with the needs of the organization first.

Measuring dimensions:

The survey showed that during ab-initio testing, the highest number of measuring dimensions were applied (biographical data, mental abilities, pilot-specific competencies, personality traits and social abilities). With increasing flight experience (from ready entry pilots to first officers and captains) the number of measuring dimensions and their methodical qualification was reduced (a fact that should be questioned) and flight checks in full flight simulators were added (see Section 3.3 Lessons Learned from the Industry).

9.4 PRESENTATION OF RESULTS TO THE APPLICANT

Time should definitely be spent on the decision of when and how the candidate will be confronted with his/her testing results. Irrespective of the associated costs, a detailed and thorough feedback can be very helpful for the candidate, especially if the result is negative. Feedback may be provided in written form, or personally, by selection team members. The majority of survey respondents provide pass/fail information only. Some provide descriptions of measured strengths and weaknesses and a few give a profile regarding important or all measuring dimensions. Likewise, about half of the respondents communicate the result in written form and the other half by personal conversation.

9.5 PREPARATION COURSES

Pre-information about the aptitude testing program can be obtained on numerous websites of operators and testing providers. Consequently, commercial preparation seminars have become popular in many regions of the world. Some basic mental abilities can be trained very effectively in a short time but then diminish quickly again over time. Social-interactive skills as well as language skills can be trained and knowledge can accumulate with less degradation over time.

This causes problems for testing systems in coping with quite differently prepared applicants. This needs to be taken into consideration when evaluating the results. The majority of survey respondents do not support preparation courses.

9.6 REAPPLICATION

Subsequent tests:

The applicant may benefit from practice effects when taking the test a second time, change his/her behavior or might have gained knowledge about the test and prepared better. Therefore, test results from a retest cannot be evaluated in the same way as the first test. If the result of the first test was close to the cutoff value, the second test might be successful, although there is no real increase in performance. Additionally, test-validation procedures are negatively affected as they have been based originally on the result of one single test and not on the results of a second run.

Pre-knowledge of tests:

The same applies to the fact that tests cannot be kept secret over a long period of time. In many cases, organizations provide a general overview to their applicants in advance. Applicants who have completed the tests pass the information to others. Similarly, career counselors and preparation institutes investigate test content as well to optimize their own preparation courses. Therefore, organizations should establish a policy on how to protect their aptitude testing procedures.

Allowing retesting:

As the value of practice fades over time, retesting should only be allowed after a certain time has passed. In general, test repetition may be justified on the basis that there are reasons to believe the performance of a candidate has improved. Also, there are some KSAs which can be improved in a relatively short time by additional training (with a resulting stable performance). In such cases a retest may also be acceptable after completion of the training. Some institutions cater for this by providing not only green/red (pass/fail) decisions but an additional amber state, which allows retesting under predefined conditions.

Same test procedures:

Most of the survey respondents who stated they did allow retests did not alter the testing procedure for reapplying candidates. Instead, they required the same tests to be taken again.

9.7 VALIDITY PERIOD OF RESULTS

Retention of records:

If a candidate, for any reason, cannot be hired or the hiring decision needs to be delayed, a decision has to be taken for how long positive test results can be kept valid. Generally, psychological research may suggest that with increasing age of the candidate, test results can be assumed as being more stable over time. The survey has shown that ab-initio candidates are most frequently kept valid for two years, ready entry candidate results for zero years, first officer candidate results for two years and captain candidate results for one year.

9.8 EVALUATION OF THE APTITUDE TESTING SYSTEM

The evaluation process of aptitude testing systems needs scientific support. The process should be incorporated in the quality assurance system of the company. Should the company use a service provider for testing purposes, the provider should have a certified quality system.

Evaluation of the aptitude testing system addresses the question of its validity (whether or not a test measures what it is intended to measure). Tracking validity requires an effective flow of data. The testing system itself cannot be validated therefore every test must be tracked for its output validity. Evaluation means that the score of a measuring dimension or test (scientifically called “predictor”) is correlated with the recorded outcome in terms of job performance (i.e., dropout rate during upgrading training). This typically is a task for an aviation psychologist or trained aviation human factors expert, who will also evaluate whether the chosen correlations are meaningful and stable over applicants and time.

10 FINANCIAL ASPECTS

Pilot aptitude testing is considered an integral part of hiring and staff retention. Its costs therefore, should be related to the overall costs of hiring and staff retention. Appropriate testing of staff and the effort to retain selected staff in the organization are closely correlated; good selection is perceived as a stabilizing factor for the organization and reduces the effort of staff retention. Although the costs for testing can be tracked easily, the costs of recruitment and hiring are more complex and staff retention costs might even be difficult to judge.

A variable requirement:

Depending on the market situation, the demand for pilots, and the attractiveness of the organization looking for new staff, can be variables in a cycle. As a result, the selection process as a task can be permanent or sporadic, simple or elaborate task. Most organizations today rely on the internet to advertise jobs for pilots. However, the staff's personal contacts for potential applicants may also play an important role. Government incentives for recruiting, training or staff retention seem not to be available in aviation.

Need and cost effectiveness:

Being convinced that a well-designed intake system for new staff is beneficial for the organization is not enough. Before proceeding with the implementation of a selection system, management usually needs to be convinced of its cost effectiveness.

In this context the following two aspects are particularly interesting:

10.1 COST EFFECTIVENESS OF APTITUDE TESTING SYSTEMS

Comparative analysis:

Determining the cost effectiveness of aptitude testing systems requires financial analysis and lists of all known disadvantages of the existing hiring, training and staff retention practices which result from the present absence of a selection system and adding a financial value to each of them. Consequently, the costs of disadvantages can be compared to the costs of a selection system.

10.2 STRUCTURE AND CONTRIBUTIONS

The existing process of recruitment and testing should be reviewed. The main cost drivers can be identified and should then be organized (where possible) in such a way that the associated costs are minimized.

Primary cost considerations:

1. **Which actions must be taken to assure a sufficient number of applicants?**
2. **What are the costs of recruitment?**
3. **What are the costs of testing?**
4. **What items comprise the total costs per new hire?**
   - recruitment costs
   - testing costs
   - training costs
   - administrative costs

5. **Who pays?**
   - the organization
   - the applicant
   - the applicant prepays and is reimbursed by the organization
   - the organization prepays and is reimbursed by the applicant

6. **Which costs are "shared" among the involved parties?**
   - costs of testing
   - costs of training
   - costs of administration

Expert outsourcing:

When building the hiring process, outsourcing of certain modules should be considered. A number of expert service providers supply professional pilot aptitude testing solutions offer at globally competitive prices. Some of these providers use internet to administer tests and therefore are location-independent and cost effective.

Conclusion:

A professionally administered Pilot Aptitude Testing (PAT) program may be viewed as a significant cost at first, but in relation to the far greater potential cost of a failed selection process, it must be seen as the first critical step in developing a piloting career. As such it can be seen as the cement poured into the foundations of an effective airline Safety Management System.

APPENDIX 1

IATA-ITQI ONLINE PILOT SELECTION SURVEY AND REPORT

Data Processing and Report

December 2009-12-18

ITQI Selection Working Group

CONTENT

I. HISTORY OF THE QUESTIONNAIRE

The questionnaire was developed by the ITQI Working Group "Selection" from October 2008 until June 2009 and distributed online to Legacy Carriers, Regional Airlines, Business Aviation, Cargo Carriers, Pilot Training Organizations, Universities with Aviation Fachlties and Pilot Selection Providers. The online survey started end of June 2009 and and finished early August 2009. From September till December 2009 data processing took place. Evaluation, analysis and the creation of the first draft of the relevant guidance material was finished in January 2010. The questionnaire was realized as an online concept which automaticly presenteted the questions. Most of the questions could be answered by yes/no or by slection of one or more answering categories from a list of alternatives. In some cases free style answering was allowed.

II. DESCRIPTION OF THE SAMPLE

110 institutions logged in.

66 institutions filled in one or two parts of the questionnaire or the whole questionnaire.

The following table II.1. shows how many institutions answered which part of the questionnaire.

Tab. II.1.: Frequencies of institutions answering parts of the questionnaire	
Parts	Frequency of institutions
Part I	53
Part II	19
Part III	19

53 institutions only filled in part I, 19 filled in part II and 19 filled in part III. (see Attachment 1)

The following table II.2. shows, how many institutions answered how many parts of the questionnaire.

Tab. II.2.: How many institutions answered how many parts of the questionnaire	
No. of parts	Frequency of institutions
1 part	53
2 parts	1 (1 + 2; 2 + 3; 1 + 3)
3 parts	12 (1 + 2 +3)

53 institutions only filled in one part (1 or 2 or 3).
1 institution filled in two parts (1 and 3 or 1 and 2 or 2 and 3).
12 institutions filled in the whole questionnaire (three parts).

III. WHY WAS THE QUESTIONNAIRE NOT ANSWERED (REASONS).

The institutions, who decided not to answer the questionnaire or parts of it, were asked, why they did not intend to answer (see: Table III.1.). 51 institutions answered this question, but only 6 institutions gave an answer which was relevant for the content of this question. (4 in Tab. III.1. und 2 in Tab. III.2.). The remaining institutions (n = 45) left the question unanswered.

The following table III.1. shows how many institutions had which reasons for not answering the questionnaire.

Tab.III.1.:	Reasons why the questionnaire has not been answered		
	Answering categories	No. of Institutions (yes)	No. of Institutions (no)
1	The questionnaire would be too time consuming	2	49
2	We do not have reliable data available	1	50
3	We have a selection system in place but it is under development	1	50
4	We have no formalised selection system in place	0	51

The institutions who did not answer the questionnaire but answered the question above, in no case stated, that they do not have a formalized selection system in place (see: table III.1. no. 4).

The following table III.2. shows additional reasons for a non-response mentioned by some institutions.

Tab. III.2.: Other reasons			
No.	Categories	Frequency	Percent
1	Our selection system has been outsourced to CAE, so called 'Pilot Provisioning Program'	1	,9
2	We are a maintenance training organization and do not recruit pilots	1	,9

So there also have been institutions who logged in, but did not answer the questionnaire, because they did not do any selection (see: III.2. no. 2.).

IV. TYPES OF OPERATIONS PERFORMED BY THE ANSWERING INSTITUTIONS

In order to give a first impression of the target group which answered the questionnaire, question 35 is put at the very beginning of this report. It asks how many institutions perform which type(s) of operation(s).

Question 35: Which types of operations are you performing?

A total of 57 institutions dealt with this question. It has been included in all parts of the questionnaire.

6 institutions did not make any input. 43 institutions mentioned between 1 and 7 types of operation. In total 69 institutions marked one or more types of operation (in various combinations). There are 12 different combinations.

Tab. IV.1.: Types of operation

Type of operation	Corporate	Regional	Legacy	Approved Training Organization	Cargo	Low Cost Carrier	Non Scheduled charter	Other operations
No. of operations	23	8	8	13	7	4	6	4
No. of institutions	23	31	39	52	59	63	69	73

Beyond the types of operations predefined by the questionnaire, 4 institutions introduced additional operations. The following table IV.2. specifies this category.

Tab. IV.2.: Other operations

Categories			
Aircraft manufacture, flying demonstration, training and transportation trips	Carrier	Consultant to all types of Carriers	Provide selection services to FTO`s and TRTO/ Airlines
1	1	1	1

The following table IV.3. shows how many institutions perform which combinations of operations.

Tab.IV.3.: Types of operations and number of institutions		
No.	Types of Operations	No. of Institutions
1	Corporate	14
2	Regional	4
3	Legacy	4
4	Approved Training Organization	8
5	Cargo	1
6	Low Cost Carrier	0
7	Non Scheduled Charter	0
8	Corporate/Regional	1
9	Corporate/Cargo	1
10	Regional/ Approved Training Organization	1
11	Corporate/Non Scheduled Charter	1
12	Corporate/ Approved Training Organization/ Cargo/Low Cost Carrier	1
13	Regional/ Approved Training Organization /Low Cost Carrier/Non Scheduled Charter	1
14	Corporate/ Regional/Lgacy/Approved Training Organization/ Cargo/Low Cost Carrier/Non Scheduled Charter	2

V. RESULTS OF THE QUESTIONS

1. Kind of Personnel Employed

Question 1: Which kind of personnel are you employing/recruiting?

This question was answered by 51 institutions.

The following table 1.1. shows, how many institutions employ which kind of target groups.
Most of the institutions employ candidates from several different groups.

Tab.1.1: No. of institutions and type of groups employed by the answering institutions	
Groups	No. of institutions
Ab Initio	30
Ready Entry l.e.	20
FO's	27
Cpt.s	18

Most of the institutions recruit (n = 30) Ab Initio candidates.The least institutions (n = 18) recruit Cpt.s.

The following table 1.2. shows more details on how many institutions employ which types of staff (1). Some institutions do not employ any staff.

Tab.1.2.: Candidates employed					
No.	Ab initio	Ready Entry (low experience)	FOs	Cpt.s	Sums of groups
1	1	0	0	0	1
2	0	0	0	1	1
3	0	1	1	0	2
4	0	1	0	0	1
5	0	1	1	1	3
6	1	1	1	0	3
7	0	0	0	1	1
8	0	0	0	0	0
9	1	1	1	1	4
10	1	0	0	0	1
11	1	0	1	1	3
12	0	0	0	0	0
13	1	1	1	0	3
14	1	1	0	0	2
15	1	0	0	0	1
16	1	0	0	0	1
17	1	1	1	0	3
18	0	0	0	0	0
19	1	0	1	1	3
20	0	0	1	0	1

Tab.1.2.: Candidates employed						
No.		Ab initio	Ready Entry (low experience)	FOs	Cpt.s	Sums of groups
21		0	1	1	1	3
22		1	0	0	1	2
23		0	1	1	0	2
24		1	0	1	0	2
25		1	1	1	0	3
26		1	1	1	0	3
27		0	1	1	1	3
28		1	0	0	0	1
29		1	0	1	0	2
30		1	0	1	0	2
31		1	0	1	1	3
32		1	1	0	0	2
33		1	1	0	0	2
34		0	0	0	1	1
35		1	0	0	0	1
36		0	0	0	1	1
37		1	0	1	0	2
38		0	0	1	1	2
39		0	0	1	0	1
40		0	0	1	1	2
41		0	0	1	1	2
42		0	1	1	1	3
43		1	0	0	0	1
44		1	1	1	0	3
45		0	0	0	0	4
46		1	1	0	0	2
47		0	0	1	1	2
48		1	1	0	0	2
49		1	1	0	0	2
50		1	0	0	0	1
51		1	0	1	1	3
Total	N	51	51	51	51	

15 of the institutions only employ one group. 17 of the institutions employ two different groups. 14 of the institutions employ 3 different groups. 2 of the institutions employ candidates from each one of the groups. 3 institutions do not employ candidates from any group at all (entities which provide selection for others)

As there is no formal definition of the expression „low experience“ to characterize the Ready Entry group, the institutions were asked how they apply this term.

The following table 1.3. shows the definitions of „low experience“ stated by the different institutions. The data are based on the answers of 20 institutions.

Tab. 1.3.: Definition of “low experience”		
No.	Categories	Frequency of institutions
1	<1500	1
2	<500hdv	1
3	200 hours	1
4	200 hrs CPL Mult IR	1
5	250 Flying hours & Multi0-Engine 50 Flying hours (Licenced Pilots) or Ex-military pilots with1000 Fly	1
6	350 hrs heavy twin, fixed wing	1
7	4 year college students	1
8	500 h	1
9	500 hours	1
10	500 hrs	1
11	CIVIL AVIATION COLLEGE 230HOURS OF FLT TIME,ME,IR	1
12	Civil Aviation College, 230 Hours of flying time, ME, IR	1
13	CPL IR MPA	1
14	CPL IR	1
15	FI IRI CRI SFI TRI TRE	1
16	Graduation from Civil Aviation College. 230 Hour of flying. Holding ME, IR	1
17	Less 2000 hr ttl with little or no jet experience	1
18	Less than 500h	1
19	Licensed specialists (i.e. Flt. Navigators, Flight engineers)	1
20	Low experience	1

The definitions show significant differences with regard to the understanding of „low experience“. Reasons for this could be caused by the type of operation, the aircraft used, differences of the education systems, legal requirements, but also historical influences.

2. Amount and Costs of Pilot Selection

Question 2: For which of the defined groups do you have a selection concept in place?

This question refers to the institutions who have a selection concept in place for one or several target groups. It was answered by 13 institutions. 10 of them confirmed having a concept for one or several of the defined target groups.
Compared with the data from question 55 (see: above) these are much less institutions (25/10). This difference refers to the different number of institutions who answered the repective questions.

Survey: For which of the defined groups do you have a selection concept in place

Tab. 2.1.: Number of institutions which have an own selection concept in place.				
Category	No.of institutions (Yes)	Percent of 13 (Yes)	No.of institutions (No)	Percent of 13 (No)
Ab Initio	8	61,5	5	38,5
Ready Entry	6	46,2	7	53,8
FO’s	7	53,8	6	46,2
Cpt.s	5	38,5	8	61,5

Several institutions obviously have selection concepts for several groups.
The following table 2.2. shows for which of the different target groups there are selection concepts available (1 = yes; 0 = no). The data refer to 10 institutions and to 26 selection concepts.

Survey: Availability of selection concepts compared by groups

Tab. 2.2.: Overview of selection concepts with regard to groups					
	Frequency of institutions per group				
No.	Ab initio	Ready Entry	FO's	Cpt.s	Sums of groups
1	1	1	0	1	3
2	1	1	1	1	4
3	1	0	0	0	1
4	0	1	1	1	3
5	1	0	1	0	2
6	1	1	1	1	4
7	0	0	1	1	2
8	1	1	1	0	3
9	1	1	0	0	2
10	1	0	1	0	2
Sums	8	6	7	5	

10 institutions stated that they have a selection system for one or more career groups.
For Ab Initio candidates most of the participating institutions (n = 8) have a selection system.
For Cpt.s the least institutions have a selection system (n = 5).
Only 2 of the participating institutions have a system for all four groups. 1 institution only has a selection concept for one group, 4 have a selection concept for two groups and 3 for three groups.

The following table 2.3. contains the data of the 10 institutions. It allows the comparision of operations these institutions perform and groups they have a selection system for (. = no answer; 1 = yes; 0 = no).

Tab. 2.3.: Selection systems with regard to operations performed and groups											
	Operations							Groups			
No. of institutions	Corporate	Regional	Legacy	(ATO)	Cargo	Low cost carrier	Non-scheduled charter	Ab initio	Ready entry, l.e.	FO's	Cpt.s
1	.	.	.	.	.	.	.	1	1	0	1
2	1	0	0	0	0	0	0	1	1	1	1
3	0	0	0	1	0	0	0	1	0	0	0
4	0	1	0	0	0	0	0	0	1	1	1
5	0	0	1	0	0	0	0	1	0	1	0
6	.	.	.	.	.	.	.	1	1	1	1
7	1	0	0	0	0	0	0	0	0	1	1
8	.	.	.	.	.	.	.	1	1	1	0
9	.	.	.	.	.	.	.	1	1	0	0
10	.	.	.	.	.	.	.	1	0	1	0
Total	2	1	1	1	0	0	0	8	6	8	5

This data does not show any systematical connection between the selected groups and the performed operations.
There are 8 institutions who select Ab Initios and 8 institutions who select FO's. 6 select Ready Entries and 5 select Cpt.s. There can be made out a perceptible trend toward an equipment with selection systems for several groups . Only one institution (no. 3) has a selection system only for 1 group (Ab Initio).

The lines with no type of operations belong to the 5 institutions who perform selection (services, consulting) but no operations.

Question 3: How many candidates have been tested in total during the recent three years?

The following tables 2.4. – 2.15. show how many candidates of the different career groups were tested by the institutions in the years 2006, 2007 and 2008.

A. Number of selected candidates: Ab Initio

12 institutions answered the question with regard to the year 2006.

Ab initio: Year 2006

Tab. 2.4.: Tested Ab Initio candidates 2006			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	1	8,3
2	10	1	8,3
3	21	1	8,3
4	36	1	8,3
5	49	1	8,3
6	100	1	8,3
7	116	1	8,3
8	135	1	8,3
9	204	2	16,7
10	1000	1	8,3
11	4862	1	8,3
Total of institutions:		12	100,0

In total n = 6737 Ab Initio candidates were tested by the 12 represented institutions in the year 2006.

12 institutions answered the question with regard to the year 2007.

Ab initio: Year 2007

Tab. 2.5.: Tested Ab Initio candidates 2007			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	1	8,3
2	10	1	8,3
3	22	1	8,3
4	40	1	8,3
5	62	1	8,3
6	141	1	8,3
7	151	1	8,3
8	200	1	8,3
9	243	2	16,7

Tab. 2.5.: Tested Ab Initio candidates 2007			
No.	Frequ. of candidates	Frequ. of institut.	Percent
10	1000	1	8,3
11	4415	1	8,3
Total of institutions:		12	100,0

All in all n = 6527 Ab Initio candidates were tested by the 12 represented institutions in the year 2007.

15 institutions answered the question with regard to the year 2008.

Ab initio: Year 2008

Tab. 2.6.: Tested Ab Initio candidates 2008			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	12	1	6,7
2	20	1	6,7
3	25	1	6,7
4	35	1	6,7
5	40	1	6,7
6	46	1	6,7
7	50	1	6,7
8	130	1	6,7
9	177	1	6,7
10	200	1	6,7
11	280	1	6,7
12	300	2	13,3
13	1000	1	6,7
14	4997	1	6,7
Total of institutions:		15	100,0

In total n = 7612 Ab Initio candidates were tested by the 15 represented institutions in the year 2008.

B. Number of tested candidates: Ready Entry

The following tables 2.7. – 2.9. show how many candidates from the group of the Ready Entries were tested in the years 2006, 2007 and 2008.

With regard to the year 2006 the question was answered by 10 institutions.

Ready Entry: Year 2006

Tab. 2.7.: Tested Ready Entry candidates 2006			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	2	20,0
2	8	1	10,0
3	15	2	20,0
4	61	2	20,0
5	75	1	10,0
6	160	1	10,0
7	600	1	10,0
Total of institutions:		10	100,0

All in all n = 995 Ready Entry candidates were tested by the 10 represented institutions in the year 2006.

With regard to the year 2007 the question was answered by 11 institutions.

Ready Entry: Year 2007

Tab. 2.8.: Tested Ready Entry candidates 2007			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	2	18,2
2	8	1	9,1
3	9	1	9,1
4	10	1	9,1
5	20	1	9,1
6	55	1	9,1
7	56	2	18,2
8	129	1	9,1
9	600	1	9,1
Total of institutions:		11	100,0

All in all n = 943 Ready Entry candidates were tested by the 11 represented institutions in the year 2007.

With regard to the year 2008 the question was answered by 13 institutions.

Ready Entry: Year 2008

Tab. 2.9.: Tested Ready Entry candidates 2008			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	2	15,4
2	2	1	7,7
3	4	1	7,7
4	12	1	7,7
5	15	1	7,7
6	20	1	7,7
7	29	1	7,7
8	30	1	7,7
9	49	2	15,4
10	258	1	7,7
11	400	1	7,7
Total of institutions:		13	100,0

All in all n = 868 Ready Entry candidates were tested by the 13 represented institutions in the year 2008.

C. Number of tested candidates: FO's

The following tables 2.10 – 2.12. show how many candidates from the group of the FO's were tested by the institutions.

With regard to the year 2006 the question was answered by 9 institutions.

FO's: Year 2006

Tab. 2.10.: Tested FO's in 2006			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	2	22,2
2	15	1	11,1
3	21	2	22,2
4	40	1	11,1
5	55	1	11,1
6	141	1	11,1
7	300	1	11,1
Total of institutions:		9	100,0

All in all n = 593 FO's were tested by the 9 represented institutions in the year 2006.

With regard to the year 2007 the question was answered by 12 institutions.

FO's: Year 2007

Tab. 2.11.: Tested FO's in 2007			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	1	8,3
2	3	1	8,3
3	5	1	8,3
4	9	1	8,3
5	17	1	8,3
6	22	1	8,3
7	60	1	8,3
8	65	2	16,7
9	134	1	8,3
10	300	1	8,3
11	750	1	8,3
Total of institutions:		12	100,0

All in all n = 1430 FO's were tested by the 12 represented institutions in the year 2007.

With regard to the year 2008 the question was answered by 15 institutions.

FO's: Year 2008

Tab. 2.12.: Tested FO's in 2008			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	1	6,7
2	2	1	6,7
3	5	1	6,7
4	6	1	6,7
5	8	1	6,7
6	10	1	6,7
7	13	1	6,7
8	15	1	6,7
9	35	1	6,7
10	42	1	6,7
11	60	1	6,7
12	63	1	6,7
13	65	1	6,7
14	200	1	6,7
15	750	1	6,7
Total of institutions:		15	100,0

All in all n = 1274 FO's were tested by the 15 represented institutions in the year 2008.

D. Number of tested candidates: Cpt.s

The following tables 2.13. – 2.15. show how many Cpt. candidates were tested in the years 2006 – 2008 by the participating institutions.

With regard to the year 2006 the question was answered by 10 institutions.

Cpt.s: Year 2006

Tab. 2.13. Tested Cpt.s in 2006			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	2	20,0
2	1	1	10,0
3	3	1	10,0
4	4	1	10,0
5	12	1	10,0
6	40	1	10,0
7	65	1	10,0
8	140	1	10,0
9	300	1	10,0
Total of institutions:		10	100,0

All in all n = 565 Cpt.s were tested by the 10 represented institutions in the year 2006.

With regard to the year 2007 the question was answered by 9 institutions.

Cpt.s: Year 2007

Tab. 2.14. Tested Cpt.s in 2007			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	2	22,2
2	10	1	11,1
3	11	1	11,1
4	19	1	11,1
5	55	1	11,1
6	60	1	11,1
7	78	1	11,1
8	300	1	11,1
Total of institutions:		9	100,0

All in all n = 533 Cpt.s were tested by the 9 represented institutions in the year 2007.

With regard to the year 2008 the question was answered by 14 Institutions.

Cpt.s: Year 2008

Tab. 2.15.: Tested Cpt.s in 2008			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	3	21,4
2	1	2	14,3
3	2	1	7,1
4	5	1	7,1
5	10	2	14,3
6	19	1	7,1
7	60	2	14,3
8	69	1	7,1
9	100	1	7,1
Total of institutions:		14	100,0

All in all n = 337 Cpt.s were tested by the 14 represented institutions in the year 2008.

Question 4: How many candidates passed the selection process successfully in the last year?

The following tables 2.16 - 2.19. show how many candidates of the different groups in 2008 passed the selection within the different institutions.

The following question was answered by 19 institutions.

Ab initio

Tab. 2.16.: Passed Ab Initio candidates in 2008			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	2	10,5
2	5	1	5,3
3	6	1	5,3
4	9	1	5,3
5	12	3	15,8
6	13	1	5,3
7	14	1	5,3
8	16	1	5,3
9	31	1	5,3
10	61	2	10,5
11	80	2	10,5
12	162	1	5,3
13	200	1	5,3
14	384	1	5,3
Total of institutions:		19	100,0

With regard to the Ab Initios at the answering institutions n = 1158 candidates passed the selection process successfully.

The following question was answered by 11 institutions.

Ready entry

Tab. 2.17.: Passed Ready Entry candidates in 2008			
No.	Frequ. of candidates	Frequency of institut.	Percent
1	2	2	18,2
2	6	2	18,2
3	8	1	9,1
4	9	1	9,1
5	12	1	9,1
6	16	2	18,2
7	73	1	9,1
8	100	1	9,1
Total of institutions:		11	100,0

With regard to the Ready Entries at the answering institutions n = 250 candidates passed the selection process successfully.

The following question was answered by 14 institutions.

FO's

Tab. 2.18.: Passed FO candidates in 2008			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	2	2	14,3
2	3	1	7,1
3	4	1	7,1
4	6	1	7,1
5	7	1	7,1
6	8	1	7,1
7	10	1	7,1
8	11	1	7,1
9	20	1	7,1
10	45	1	7,1
11	100	1	7,1
12	350	1	7,1
13	500	1	7,1
Total of institutions:		14	100,0

With regard to the FO's at the answering institutions n = 1068 candidates passed the selection process successfully.

The following question was answered by 13 institutions.

Cpt.s

Tab. 2.19.: Passed Cpt. candidates in 2008			
No.	Frequ. of candidates	Frequ. of institut.	Percent
	1	2	15,4
1	2	1	7,7
2	5	1	7,7
3	8	2	15,4
4	9	1	7,7
5	12	1	7,7
6	17	1	7,7
7	20	1	7,7
8	28	1	7,7
9	100	1	7,7
10	130	1	7,7
Total of institutions:		13	100,0

With regard to the Cpt.s at the answering institutions n = 341 candidates passed the selection process successfully.

Question 5: How many candidates did you hire (did you give a contract) in the last year?

The following tables 2.20 – 2.23. show how many candidates from the different career groups were hired by the answering institutions in the year 2008.

The following question was answered by 15 institutions.

Ab initio

Tab. 2.20.: Hired Ab Initio candidates in 2008			
No.	Frequ. of candidates	Frequ. of institut.ns	Percent
1	5	1	6,7
2	6	1	6,7
3	9	1	6,7
4	12	2	13,3
5	14	1	6,7
6	15	1	6,7
7	31	1	6,7
8	35	1	6,7
9	58	1	6,7
10	60	2	13,3
11	140	1	6,7
12	168	1	6,7
13	199	1	6,7
Total of institutions:		15	100,0

All in all n = 824 Ab Initio candidates were hired by the answering institutions.

The following question was answered by 10 institutions.

Ready Entry

Tab. 2.21.: Hired Ready Entry candidates in 2008			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	0	1	10,0
2	2	1	10,0
3	4	1	10,0
4	6	2	20,0
5	8	1	10,0
6	10	1	10,0
7	16	1	10,0
8	56	1	10,0
9	73	1	10,0
Total of institutions:		10	100,0

All in all n = 181 Ready Entry candidates were hired by the answering institutions.

The following question was answered by 15 institutions.

FO's

Tab. 2.22.: Hired FO candidates in 2008			
No.	Frequ. of candidates	Frequ. of institut.	Percent
1	2	3	20,0
2	4	1	6,7
3	6	1	6,7
4	7	1	6,7
5	8	1	6,7
6	11	2	13,3
7	18	1	6,7
8	20	1	6,7
9	24	1	6,7
10	35	1	6,7
11	350	1	6,7
12	500	1	6,7
Total of institutions:		15	100,0

All in all n = 1000 FO candidates were hired by the answering institutions.

The following question was answered by 15 institutions.

Cpt.s

Tab. 2.23.: Hired Cpt. candidates in 2008			
No.	Frequ. of candidates	Frequ. of institut.	Percent
	0	1	6,7
	1	3	20,0
	2	1	6,7
	3	1	6,7
	5	1	6,7
	8	1	6,7
	9	1	6,7
	17	1	6,7
	19	1	6,7
	20	1	6,7
	22	1	6,7
	28	1	6,7
	130	1	6,7
Total of institutions:		15	100,0

All in all n = 266 Cpt. candidates were hired by the answering institutions.

The following table 2.24. shows the overall number of institutions in each case, as well as the tested, accepted and hired candidates with regard to the different groups.

Please keep in mind that the values of tested, passed and hired candidates in the table 2.24 can not be correlated column by column, as different numbers of institutions are contained in the cumulative values.

Tab. 2.24.: Tested, accepted and hired candidates with regrad to the different groups in 2008						
Groups	No. of institutions	No. of tested candidates	No. of institutions	No. of passed candidates	No. of institutions	No. of hired candidates
Ab initio	16	12609	19	1158	15	824
Ready	13	868	11	250	10	181
FO's	15	1274	14	1068	15	1000
Cpt.`s	4	341	13	341	15	266

The table above shows that the biggest fluctuation exists in the Ab Initio sector. The smallest fluctuation applies to Cpt.s.

The following tables 2.25 – 2.28. show the relations between tested and passed candidates of the four groups.
In this case the 2 data sets refer to the same institutions and groups.

The following table 2.25. indicates the relation between tested and passed Ab Initio candidates at the different institutions.

Ab Intio

Tab. 2.25.: Tested and passed Ab Initio candidates		
No.	Tested in the Year 2008	Passed the selection process
1	280	14
2	12	12
3	130	80
4	40	12
5	46	9
6	1000	200
7	177	162
8	25	5
9	50	16
10	200	80
11	300	384
12	4997	61
13	4997	61
14	20	31

The following table 2.26. indicates the relation between tested and passed Ready Entry candidates at the different institutions.

Ready Entry

Tab. 2.26.: Tested and passed Ready Entry candidates		
No.	Tested in the Year	Passed the selection process
1	258	73
2	15	2
3	2	2
4	12	16
5	20	8
6	400	100
7	29	16
8	30	12
9	0	9
10	49	6
11	49	6

The following table 2.27. indicates the relation between tested and passed FO candidates at the different institutions.

FO's

Tab. 2.27.: Tested and passed FO candidates		
No.	Tested in the Year 2008	Passed the selection process
1	6	2
2	10	6
3	8	4
4	15	2
5	5	3
6	750	500
7	60	10
8	42	11
9	200	100
10	13	7
11	65	20
12	63	45
13	2	8

The following table 2.28. indicates the relation between tested and passed Cpt. candidates at the different institutions.

Cpt.s

Tab. 2.28.: Tested and passed Cpt. candidates		
No.	Tested in the Year 2008	Passed the selection process
1	1	1
2	60	28
3	10	8
4	5	8
5	60	12
6	100	100
7	10	9
8	1	1
9	2	2
10	69	20
11	0	5

The selection rate, i.e. the number of accepted applicants in relation to the number of tested applicants varies significantly between the particular institutions.

The following table 2.29 is based on the data of 26 institutions and shows, how many institutions employed how many candidates in which combinations. It could be misleading, to relate these figures to the figures of the relation between tested candidates and succesful candidates (cf. Ta. 2.25 – 2.28), because the employed persons often do not refer to the same year and succesful candidates often do not get employed in the year of the selection.

In this table the figures in the columns can be compared with one another. Only those institutions (line numbers) are listed, who actually employed staff.

Tab. 2.29.: Number of hired candidates differentiated by groups				
No.	Ab initio	Ready entry	FOs	Cpt.s
1	.	.	2	1
2	.	.	.	2
3	14	73	6	28
4	.	.	4	8
5	58	2	2	.
6	6	.	.	.
7	35	.	35	19
8	.	.	2	3
9	.	.	.	17
10	12	16	.	.
11	.	.	500	.
12	12	8	18	22
13	9	.	11	.
14	168	0	24	0
15	140	56	.	.
16	5	10	.	.
17	15	.	.	.
18	.	.	7	9
19	.	.	.	1
20	.	.	.	1
21	.	.	20	20
22	199	4	11	.
23	60	6	.	.
24	.	.	350	130
25	60	6	.	.
26	31	.	8	5
Total of institutions	**15**	**10**	**15**	**15**

The number of hired candidates in the group of the Ab Initios ranges from 5 to 350, in the group of the Ready Entries from 0 to 73, in the group of the FO's from 2 to 500 and in the group of the Cpt.s from 0 to 130.

The group of the FO's shows the biggest fluctuation.

The following table 2.30. is based on the data of 26 institutions and gives an overview on the number of hired candidates in relation to the type of operation.

Tab.2.30.: Hired candidates with regard to operations

	Operations								Groups				
No.	Corporate	Regional	Legacy	ATO	Cargo	Low cost carrier	Non-sch.charter	Other operations?	Ab Initio	Ready Entry,	FOs	Cpt.s	Sum
1	1	0	0	0	0	0	0		.	.	2	1	3
2	1	0	0	0	0	0	0		.	.	.	2	2
3	1	0	0	0	0	0	0		14	73	6	28	187
4	1	0	0	0	0	0	0		.	.	4	8	12
5	1	0	0	0	0	0	0		58	2	2	.	62
6	0	0	0	1	0	0	0		6	.	.	.	6
7	0	0	0	0	1	0	0		35	.	35	19	89
8	0	1	0	0	0	0	0		.	.	2	3	5
9	1	0	0	0	0	0	0		.	.	.	17	17
10	1	0	0	0	0	0	0		12	16	.	.	28
11	0	0	0	0	0	0	0	consultant	.	.	500	.	500
12	0	1	0	1	0	0	0		12	8	18	22	60
13	0	1	0	0	0	0	0		9	.	11	.	20
14	1	0	1	1	1	1	1		168	0	24	0	192
15	1	0	0	1	1	1	0		140	56	.	.	196
16	0	0	0	1	0	0	0		5	10	.	.	15
17	0	0	0	1	0	0	0		15	.	.	.	15
18	0	1	0	0	0	0	0		.	.	7	9	16
19	1	0	0	0	0	0	0		.	.	.	1	1
20	1	0	0	0	0	0	0		.	.	.	1	1
21	1	0	0	0	0	0	0		.	.	20	20	40
22	1	0	0	0	0	0	0		199	4	11	.	214
23	1	0	0	0	1	0	1		60	6	.	.	66
24	0	0	0	0	0	0	0	Carrier	.	.	350	130	480
25	1	0	0	0	1	0	1		60	6	.	.	66
26	0	0	1	0	0	0	0		31	.	8	5	44

Question 6: How long was the system in place (year of installation, separately for the groups)?

The following tables 2.31. – 2.34. show, in which year the different institutions have installed the selection systems for the different groups.

The following question was answered by 23 institutions.

Ab initio

Tab. 2.31.: Selection system in place: Ab Initio			
No.	In place since:	Frequency	Percent
1	1956	1	4,3
2	1973	2	8,7
3	1988	3	13,0
4	1996	1	4,3
5	1998	1	4,3
6	1999	2	8,7
7	2003	2	8,7
8	2004	1	4,3
9	2005	2	8,7
10	2006	4	17,4
11	2007	2	8,7
12	2008	2	8,7
Total of institut.		23	100,0

It ranges from 1956 to 2008.

The following question was answered by 17 institutions.

Ready Entry

Tab. 2.32.: Selection system in place: Ready Entry			
No.	In place since:	Frequency	Percent
1	1955	2	11,8
2	1956	1	5,9
3	1980	1	5,9
4	1988	1	5,9
5	1992	1	5,9
6	1994	1	5,9
7	1995	1	5,9
8	1998	1	5,9
9	1999	1	5,9
10	2000	2	11,8
11	2003	1	5,9
12	2004	1	5,9
13	2005	1	5,9
14	2007	1	5,9
15	2008	1	5,9
Total of institutions:		17	100,0

It ranges from 1955 to 2008.

The following question was answered by 23 institutions.

FO's

Tab. 2.33.: Selection system in place: FO's			
No.	In place since:	Frequency	Percent
1	1946	1	4,3
2	1956	1	4,3
3	1970	1	4,3
4	1980	1	4,3
5	1994	1	4,3
6	1995	1	4,3
7	1998	2	8,7
8	1999	1	4,3
9	2000	3	13,0
10	2003	1	4,3
11	2004	1	4,3
12	2005	2	8,7
13	2006	1	4,3
14	2007	5	21,7
15	2008	1	4,3
Total of institutions:		23	100,0

It ranges from 1946 to 2008.

The following question was answered by 16 institutions.

Cpt.s

Tab. 2.34.: Selection system in place: Cpt.s			
No.	In place since:	Frequency	Percent
1	1970	1	6,3
2	1980	1	6,3
3	1989	1	6,3
4	1994	1	6,3
5	1998	1	6,3
6	1999	1	6,3
7	2000	3	18,8
8	2003	1	6,3
9	2004	1	6,3
10	2006	2	12,5
11	2007	3	18,8
Total of institutions:		16	100,0

It ranges from 1970 to 2007.

Question 7: Are you offering selection for other companies?

The following question was answered by 33 institutions.

Are you offering selection for other companies?

Tab. 2.35.: Selection services			
No.	Categories	Frequency	Percent
1	Yes	9	27,3
2	No	24	72,7
Total of institutions:		33	100,0

9 of the 33 institutions who answered question 7 offer selection for other companies, too. 24 institutions do not offer selection for other institutions.

The following table 2.36. shows, how many institutions offer selection services to other companies and for which target group.

This question was answered by 42 institutions (answers with regard to several groups were possible).

Tab. 2.36.: Institutions offering selection services for other companies				
Groups	No.of institutions (Yes)	Percent (Yes)	No.of institutions (No)	Percent (No)
Ab initio	7	16,7	35	83,3
Ready entry	7	16,7	35	83,3
FO's	6	14,3	36	85,7
Cpt.s	3	7,1	39	92,9

Question 8: What are the costs of your selection per candidate and group (US$ per candidate)?

The following table 2.37. shows, which costs the institutions have for the selection per candidate in the different groups.

The left column contains the cost levels. The following columns to the right show, how many institutions have such costs for which type of selection and group (1).

Tab. 2.37.: Costs for selection per candidate in different career groups								
Level: costs	Ab Initio Outsource	Ab Initio In House	Ready Entry Outsource	Ready Entry In House	FO's Outsource	FO's In House	Capt.s Outsource	Capt.s In House
2000	0		0		1		1	0
2940	0	1	0					0
4110	0		0	1		1		0

Question 9: What are the costs per new hire (including advertisement, selection and administration)($ per candidate/group)

This question was answered by 7 institutions.

The following table 2.38. shows, which costs per new hire of a candidate/ group were told how often by the different institutions.

In the left column costs levelsare listed. The following columns show, how many institutions have such costs per new hire of which type of group.

Tab. 2.38.: Costs per new hire				
	Frequencies of institutions on the respective level of cost per group			
Level: costs	Ab Initio (n = 7)	Ready Entry (n = 5)	FO's (n = 5)	Capt.s (n = 4)
0	3	2	1	1
500	1	0	0	0
1000	1	0	0	1
1500	0	0	1	1
4000	0	0	1	0
4500	0	1	0	0
5000	1	1	0	0
8000	0	0	1	1
12000	0	0	1	0
13050	1	0	0	0
16000	0	1	0	0

The costs per Ab Initio new hire rangefrom 0 to 13 050 US $..
The costs per Ready Entrie new hire range from 0 to 16 000 US $.
The costs per FOnew hire range from 0 to 12 000 US $.
The costs per Cpt new hire range from 0 to 8 000 US $. For the hiring of captains the lowest costs are stated.

Question 10: What actions do you take to ensure a sufficient number of applicants (several answers are allowed)?

This question was answered by 41 institutions.

The following table 2.39 show how often the different institutions use a certain type of advertisement.

Survey: Means for advertisement

Tab. 2.39.: Number of institutions which use a certain type of advertisement		
No.	Means for advertisement	No. of institutions
1	General news papers	12
2	Specialized aeronautical publications	13
3	Homepage	25
4	Personal contacts of staff to potential applicants	12
5	Organized meetings with schools/companies	11

Obviously the homepage is the far most frequently used type of advertisment. Concerning the other means, there is no significant difference in the frequency of their use.

The following table 2.40. shows other means for advertisement stated by the participating institutions.

Other means?

Tab. 2.40: Other means for advertisement		
No.	Categories	Frequency
1	Airlines provide a pool of preselected candidates from which we screen with computer based tests (COMPASS & 10P) and English language and interviews	1
2	Executive Recruiter	1
3	I am not involved in recruiting	1
4	Others take our selection tools through internet or mouth to mouth advertisement.	1
5	Own flight academy as preferred supplier for abinitio pilots. If in need of more than the school can deliver: free market	1
6	We are the countries major airline and find that applicants come to us.	1

Question 11: Which way, according to your experience, is the most effective one (type of advertisement)?

This question was answered by 31 institutions.

The following table 2.41. gives an overview of the types of advertisement, which were judged to be the most effective ones by the institutions.

Survey : Judgements on the most effective type of advertisement

Tab. 2.41.: Effectiveness of kinds of advertisement			
No.	Categories	Most effective type of advert.	Percent
1	Advertisement in general news papers	4	12,9
2	Advertisement in specialized aeronautical publications	4	12,9
3	Homepage	15	48,4
4	Personal contacts of staff to potential applicants	7	22,6
5	Organized meetings with schools/companies	1	3,2
Total of institutions/judgements:		31	100,0

The homepage was judged to be by far the most effective type of advertisment.

Question 12: How much do you invest per year in recruitment?

The following table 2.42. shows how much the 5 answering institutions spend on recruitment per year.

Tab. 2.42.: Investment for recruitment			
No.	Level of costs (US $)	Frequency of institutions	Percent
1	0	2	40,0
2	300 000	1	20,0
3	400 000	1	20,0
4	4 900 000	1	20,0
Total of institutions:		5	100,0

3. Preconditions for Being Accepted as a Candidate for Pilot Selection

Question 13: Are there any preconditions for the candidates to be accepted in your selection process?

The question was answered by 40 institutions

The following table 3.1. shows how many institutions establish preconditions for the acceptance of a candidate for the selection.

Ab Initio: Are there any preconditions for the candidates to be accepted in your selection process?

Tab. 3.1.: Preconditions for acceptance of candidates in selection			
No.	Categories	Frequency	Percent
1	Yes	36	90,0
2	No	4	10,0
Total of institutions:		40	100,0

36 of the 40 answering institutions stated that they have preconditions for their selection. These are necessary because of the requirements of the profession of pilots. There are significant differences, however, in the type of required preconditions and the level on which they are established. (cf. the following tables)

Ab Initio: Are there any preconditions for the candidates to be accepted in your selection process?

The question was answered by 36 institutions.

The following table 3.2. shows which preconditions are required by the institutions for the admission to the selection process concerning the Ab Initio group.

Tab. 3.2.: Preconditions: Ab initio			
No.	Categories	Frequency (yes)	Percent of n = 36
1	Gender	1	2,8
2	Age	16	44,4
3	School degree	15	41,7
4	School marks	7	19,4
5	Flying hours	8	22,2
6	Nationality	8	22,2
7	Ethnic groups	0	0
8	Knowledge of foreign language	3	8,3
9	Other precinditions	6	16,7

6 of the 36 institutions who answered the question require preconditions t other than the predifined categories.

The following tables 3.3. – 3.6. contain specifications of the above categories, defined by the institutions for the group of the Ab Initios.

Specifications with regard to age: Ab initio

Tab. 3.3.: Specifications: age		
No.	Categories	Frequency
1	>18	1
2	17-28	1
3	18-25	1
4	18	3
5	18 minimum	1
6	19	1
7	21	1
8	33	1
9	45	1
10	Mature candidates are expected to have relevant flying experience	1
11	Max 33	1
12	Minimum 18	1
13	Under 26	2

The minimum age ranges from 18 to 21 . One institutions stated the minimum age of 17 . The higher values refer to the upper age limit. It ranges from 26 years to 45 years.

Specifications with regard to school degree: Ab initio

Tab. 3.4.: Specifications: school degree		
No.	Categories	Frequency
1	>=bac+1	1
2	An university graduate	1
3	Bachelor's Degree	1
4	Bachelor	1
5	Fachgeb. oder allg. HS0Reife	1
6	GCE A Levels	1
7	Graduated High School	1
8	Graduation of university	1
9	HIGH SCHOOL	1
10	High School Diploma	1
11	High school graduated	1
12	High school/university/bachelor	1
13	Irish Leaving Cert	1
14	Pre college and college	1
15	Sciences preferred	1

High school and university degrees were stated most frequently.

Specifications with regard to school marks: Ab initio

Tab. 2.5.: Specifications: school marks		
No.	Categories	Frequency
1	A level in Physics, Maths	1
2	Any subjects	2
3	College degree preferred	1
4	English, Math, Science	1
5	Maths and physics	1
6	SCIENCE	1

Mathematics and Physics were stated most frequently.

Specifications with regard to flying hours: Ab initio

Tab. 3.6.: Specifications: Flying hours		Frequency
No.	Categories	Frequency
1	0	2
2	235	1
3	250	1
4	250 hr/ ME IR	1
5	500 hours	1
6	500/ME/IR for ZFTT, 150/ME/IR for full type rating	1
7	Minimum 200	1

The range goes from 0 to 500 flyings hours. There seem to be different definition of the term Ab Initio . It also may be the case that the question was not clear to everybody and some institutions stated the accumulated flying hours during their respective ab-initio course. .

Ready Entry: Are there any preconditions for the candidates to be accepted in your selection process?

The question was answered by 36 institutions.

The following table 3.7. gives a survey on how often institutions define preconditions for accepting Ready Entry candidates for the selection.

Survey: Ready Entry:

Tab. 3.7.: Preconditions: Ready Entry			
No.	Categories	Frequency (yes)	Percent of n = 36
1	Gender	1	2,8
2	Age	6	6
3	School degree	5	13,9
4	School marks	4	11,1
5	Flying hours	9	25,0
6	Nationality	5	13,9
7	Ethnic groups	0	0
8	Knowledge of foreign language	5	13,9
9	Other precinditions	2	5,6

2 institutions introduced types of preconditions which were not given in the questionnaire.

The following tables 3.8. - 3.16. show their specifications.

Specifications with regard to age

Tab. 3.8.: Specifications: age			
No.	Age limits	Frequency	Percent
1	18 - 35	1	,9
2	18 - 29	1	,9
3	18	1	,9
4	20	1	,9
5	21	1	,9
6	Mature candidates are expected to have relevant flying experience	1	,9

The range goes from 18 to 35 years.

Specifications with regard to school degree

Tab. 3.9.: Specifications: schoool degreee			
No.	Categories	Frequency	Percent
1	Bachelor's Degree	1	,9
2	EPL	1	,9
3	Fachgeb. oder allg. HS-Reife	1	,9
4	Junior College	1	,9
5	Minmum highschool incl. maths/physics	1	,9

Specifications with regard to school marks

Tab. 3.10.: Specifications: school marks			
No.	Categories	Frequency	Percent
1	A levels in Physics or Maths	1	,9
2	C+	1	,9
3	English, Math, Science	1	,9
4	High school	1	,9

Specifications with regard to flying hours (number and specifications)

Tab. 3.11.: Specifications: flying hours			
No.	Categories	Frequency	Percent
1	200	1	,9
2	250 hours CPL/IR with frozen ATPL subjects	1	,9
3	250 hours for licenced pilots/1000 hours for military pilots	1	,9
4	350 hr heavy twin multi engine	1	,9
5	500	3	2,7
6	500 hours	1	,9
7	500 on type	1	,9

The requirement of flying hoursas a precondition ranges from 200 to 500 hours.

Specifications with regard to nationality

Tab. 3.12.: Specifications: nationality			
No.	Categories	Frequency	Percent
1	Brasilian	1	,9
2	EEC	1	,9
3	EU	1	,9
4	Korean	1	,9
5	Maltese	1	,9

Specifications with regard to ethnic groups

Tab. 3.13.: Specifications: ethnic groups			
No.	Categories	Frequency	Percent
1	0	110	100,0

Specifications with regard to knowledge of a foreign language (in the case the native language is English)

Tab. 3.14.: Specifications: foreign language			
No.	Categories	Frequency	Percent
1	0	31	86,1
2	Knowledge of a foreign language	5	13,9
	Total	36	100,0

The following tables 3.15. - 3.16. contain statements on preconditions which were not predefined in the questionnaire.

Other preconditions?

Tab. 3.15.: Other preconditions			
No.	Categories	Frequency	Percent
1	0	34	94,4
2	Other preconditions?	2	5,6
Total of institutions		36	100,0

Specifications with regard to other preconditions.

Tab. 3.16.: Specifications: Other preconditions			
No.	Categories	Frequency	Percent
1	Civil Aviation College graduate	1	,9
2	Graduation from the Civil Aviation College	1	,9

FO's: Are there any preconditions for the candidates to be accepted in your selection process?

This question was answered by 36 instituions.

The following table 3.17. gives a survey on how many institutions defined preconditions for the selection of FO's with regard to which criteria.

Survey: FO's

Tab. 3.17.: Preconditions: FO's			
No.	Categories	Frequency (yes)	Percent of n = 36
1	Gender	0	0
2	Age	6	16,7
3	School degree	4	11,1
4	School marks	1	2,8
5	Flying hours	16	44,4
6	Nationality	6	16,7
7	Ethnic groups	0	0,0
8	Knowledge of foreign language	5	13,9
9	Other preconditions	7	19,4

The number of flying hours for FO´s plays the biggest role.

The following tables 3.18. - 3.23. specify the categories which have been used in table 2.17. for the group of FO's.

Specifications with regard to age

Tab. 3.18.: Specifications: age		
No.	Age limits	Frequency
1	18-37	1
2	18	1
3	21	1
4	58	1
5	max 40 years	1
6	Minimum 18 years	1

Values for the minimum and the maximum age are specified. The range of the minimum age goes from 18 to 21 years and for the maximum age from 37 to 58 years.

Specifications with regard to school degree

Tab. 3.19.: Specifications: school, degree		
No.	Categories	Frequency
1	Fachgeb. oder allg. HS0Reife	1
2	High School Diploma	1
3	Post0secondary entrance	1
4	University	1

High school diploma and even university gradings are required as a precondition for selecting FO's.

Specifications with regard to school marks

Tab. 3.20.: Specifications: school marks		
No.	Categories	Frequency
1	High School	1

1 institution asks for high school marks as a precondition for FO's.

Specifications with regard to flying hours (number and specifications)

Tab. 3.21.: Specifications: flying hours		
No.	Categories	Frequency
1	1000 hours on high performace types	1
2	1500	2
3	200 hour	1
4	200 total	1
5	2000	1
6	250	1
7	250 hr ME IR	1
8	500	1
9	500 hours	1
10	600 total time, 300 MCC	1
11	Depends on age	1
12	Min. 1500 TT with min. 500 jet or turboprop >5,7 t MTOW	1
13	Minimum 200	1
14	Minimum 2000 hrs fixed wing	1
15	Total 1000 hours/500 hours for applying A/C type	1

Also with regard to the flying hours the requirements show substantial variety. The range goes from 200 to 2000 hours.

Specifications with regard to nationality

Tab. 3.22.: Specifications: nationality		
No.	Categories	Frequency
1	Brasilian	1
2	EEC	1
3	EU	1
4	Jordanian	1
5	Nationals of Trinidad and Tobago	1
6	Vietnamese & others	1

Partly the institutions require a certain nationality. Others restrict to political groups like EU.

Specifications with regard to ethnic groups

Tab. 3.23.: Specifications: Ethnic groups			
No.	Categories	Frequenc	Percent
1	0	110	100,0

Ethnic groups are not restricted or priviledged by any institution.

The following table 3.24 contains preconditions, which were not predefined in the questionnaire.

Other preconditions?

Tab. 3.24.: Other preconditions: FO's		
No.	Categories	Frequency
1	Airline Transport Pilot License	1
2	Candidates with additional professional qualifications beyond the flying experience will be prefered	1
3	DLR pass	1
4	English: ICAO level 4	1
5	FAA licenses	1
6	Full ATPL	1
7	Licensure	1

Cpt.s: Are there any preconditions for the candidates to be accepted in your selection process?

This question was answered by 36 institutions.

The following table 3.25. shows the frequencies of certain profiles of preconditions the institutions defined for their selection of Capts

Survey: Cpt.s: preconditions for the candidates to be accepted for which group?

Tab. 3.25.: Preconditions: Cpt.s			
No.	Categories	Frequency (yes)	Percent of n = 36
1	Gender	1	2,8
2	Age	5	14,0
3	School degree	3	8,4
4	School marks	1	2,8
5	Flying hours	12	33,6
6	Nationality	4	11,2
7	Ethnic groups	0	0,0
8	Knowledge of foreign language	2	5,6
9	Other precinditions	5	14,0

The following tables 3.26. to 3.31. show the specifications of criteria for the Cpt.s.

Specifications with regard to age

Tab. 3.26.: Specifications: age			
No.	Age limits	Frequency	Percent
1	18	1	,9
2	58	1	,9
3	Minimum 18 years	1	,9
4	Not less than 21 years old	1	,9
5	Up to 57	1	,9

The range for the minimum age goes from 18 to 21 years and for the maximum age from 57 to 58.

Specifications with regard to school degree

Tab. 3.27.: Specifications: school degree			
No.	Categories	Frequency	Percent
1	BS	1	,9
2	High School Diploma	1	,9
3	University	1	,9

Specifications with regard to school marks

Tab. 3.28.: Specifications: school marks			
No.	Categories	Frequency	Percent
1	High school	1	,9

Specifications with regard to flying hours (number and specifications)

Tab. 3.29.: Specifications: flying hours			
No.	Categories	Frequency	Percent
1	1500 hours	1	,9
2	2 000 hr PIC on Jet more 20 tons	1	,9
3	3 000	1	,9
4	3 000 hours	1	,9
5	3 500	1	,9
6	5 000	1	,9
7	6 000	1	,9
8	7 000 hours total, 3 000 PIC, international routes	1	,9
9	8000	1	,9
10	Min. 3 000 TT with min. 2 000 jet or turboprop >5,7 t MTOW	1	,9
11	Minimum 3000	1	,9
12	Total 5 000 hours/ 500 hours of PIC time	1	,9

The required minimum experience ranges 1500 to 8000 hours.

Specifications with regard to nationality

Tab. 3.30.: Specifications: nationality			
No.	Categories	Frequency	Percent
1	Brasilian	1	,9
2	EU	1	,9
3	Nationals of Trinidad and Tobago	1	,9
4	Vietnamese & others	1	,9

Specifications with regard to ethnic groups

Tab. 3.31.: Specifications: ethnic groups			
No.	Categories	Frequency	Percent
1	0	110	100

Ethnic groups are not excluded or priviledged by any of the institutions.

The following table 3.32. contains preconditions other than the predefined ones.

Other preconditions?

Tab. 3.32.: Other preconditions			
No.	Categories	Frequency	Percent
1	Candidates with additional professional qualifications beyond the flying experience preferred	1	,9
2	English: ICAO level 4	1	,9
3	Licensure	1	,9
4	Numerous	1	,9
5	Type rated	1	,9

Question 14: How long has the definition of preconditions been in place?

The following tables 3.33. to 3.36. show how long the above mentioned specifications have been valid for the different groups.

Ab initio

Tab. 3.33.: Preconditions in place: Ab Initio			
No.	Categories	Frequency	Percent
1	1 year	1	,9
2	10	1	,9
3	10 years	2	1,8
4	10 years; review each year	1	,9
5	1956	1	,9
6	20	1	,9
7	2006	1	,9
8	2007	1	,9
9	21 years	1	,9
10	3	1	,9
11	3 years	2	1,8
12	Always	1	,9
13	For 36 years	2	1,8
14	More than 20 years	1	,9
15	Since 2003	1	,9
16	Since 2008	1	,9

The range for Ab Initios goes from 1 to 36 years.

Ready Entry

Tab. 3.34.: Preconditions in place: Ready Entry			
No.	Categories	Frequency	Percent
1	1	1	,9
2	10	1	,9
3	10 years	2	1,8
4	1999	1	,9
5	2 years	1	,9
6	20	1	,9
7	20 years	1	,9
8	2000	1	,9
9	2007	1	,9

Tab. 3.34.: Preconditions in place: Ready Entry			
No.	Categories	Frequency	Percent
10	6 years	1	,9
11	For 54 years	2	1,8
12	ID	1	,9
13	More than 20 years	1	,9

The range for Ready Entries goes from 1 to 54 years.

FO's

Tab. 3.35.: Preconditions in place: FO's			
No.	Categories	Frequency	Percent
1	1	1	,9
2	10 years	3	2,7
3	1970	1	,9
4	1995	1	,9
5	1999	1	,9
6	2	1	,9
7	2 years	1	,9
8	2000	1	,9
9	2005	1	,9
10	2006	1	,9
11	2007	2	1,8
12	30	1	,9
13	5	1	,9
14	6 years	1	,9
15	at least 2 years	1	,9
16	ID	1	,9

The range for FO's goes from 1 to 30 years.

CPT.S

Tab. 3.36.: Preconditions in place: Cpt.s			
No.	Categories	Frequency	Percent
1	10 years	2	1,8
2	1970	1	,9
3	1995	1	,9
4	2 years	1	,9
5	20	1	,9
6	2006	1	,9
7	2007	2	1,8
8	3	1	,9
9	30	1	,9
10	6 years	1	,9
11	More than 20 years	1	,9

The range for Cpt.s goes from 1 to 30 years.

4. Share of Costs, the Candidates have to Pay and Incentives of the Government

Question 15: How much does the candidate contribute toward the costs of selection?

The following table 4.1. shows the frequencies of candidates in the different groups who share the costs for selection.

Tab. 4.1.: Contribution toward costs of selection		
No.	Categories	Amount (US$)
1	Ab initio (n = 7)	0
2	Ready entry (n = 5)	0
3	FO's (n = 6)	0
4	Cpt.s (n = 4)	500

In 4 institutions the Cpt.s have to pay US $ 500 for the selection.

Question 16: How much does the candidate contribute toward the costs of training?

The following tables 4.2. to 4.5. show the frequencies of candidates in the diferent groups who share the costs for training.

The following question was answered by 7 institutions.

Ab initio:

Tab. 4.2.: Contributions towards the costs of training			
No.	Categories	Frequency	Percent
1	0	4	57,1
2	45 000	1	14,3
3	84 000	1	14,3
4	120 000	1	14,3
	Total	7	100,0

In the Ab Initios group the share ranges from 45 000 to 120 000 US $.

The following table contains data of 5 institutions.

Ready Entry

Tab. 4.3.: Contributions towards the costs of training			
No.	Categories	Frequency	Percent
1	0	4	80,0
2	30 000	1	20,0
	Total	5	100,0

1 institution stated an amount of 30 000 US $ for the group of Ready Entries.

The following table contains the data of 6 institutions.

FO's

Tab. 4.4.: Contributions towards the costs of training			
No.	Categories	Frequency	Percent
1	0	6	100,0

None of the institutions is asking for a share of costs by the FO's for training.

The data in the following table are based on the answers of 4 institutions.

Cpt.s

Tab. 4.5.: Contributions towards the costs of training			
No.	Categories	Frequency	Percent
1	0	4	100,0

None of the institutions is asking for a share of costs by Cpt.s. for training.

5. Role of Government and Regulatory Authority

Questions 17 - 19: Do you receive any government incentives for recruiting (Question 17), training (Question 18), staff retention (Question 19)?

The following table 5.1. shows how many institutions get any government incentives for recruiting (Q. 17), training (Q. 18) and staff retention (Q. 19).

Survey of the questions 17 to 19:

Tab. 5.1.: Government incentives for recruiting		
No.	Categories	Amount (US$)
1	Recruiting (n = 10)	0
2	Training (n = 11)	0
3	Staff retention (n = 11)	0

None of the institutions get any government support in terms of funding recruitment, training or staff retention .

Question 20: Has your state a legal requirement for selection of pilots besides ICAO medical provisions and language proficiency

The following tables 5.2. to 5.5. show which legal requirements influence the type of selection for the different groups.

The data in the following table 5.2. are based on the answers of 3 institutions.

Ab initio

Tab. 5.2.: Legal requirements of the government		
No.	Categories	Frequency
1	Class1	1
2	NATIONAL LICENSE	1
3	Medical clearance by state aviation authority	1

The data in the following table 5.3. are based on the answers of 3 institutions.

Ready Entry

Tab. 5.3.: Legal requirements of the government		
No.	Categories	Frequency
1	Class1	1
2	Medical clearance by state aviation authority	1
3	Security check	1

The data in the following table 5.4. are based on the answers of 3 institutions.

FO's

Tab. 5.4.: Legal requirements of the government		
No.	Categories	Frequency
1	NATIONAL LICENSE	1
2	level 4 and Class1	1
3	Many laws pertaining to discrimination. Too many to describe	1
4	Security check	1

The data in the following table 5.5. are based on the answers of 3 institutions.

Cpt.s

Tab. 5.5.: Legal requirements of the government		
No.	Categories	Frequency
1	FAA, JARS OR NATIONAL LICENSE	1
2	Medical clearance by state aviation authority	1

Question 21: Does your reg. authority perform any selection in addition to ICAO medical provisions and language proficiency?

This question was answered by 32 institutions.

The following table 5.6. shows the number of institutions, who confirm, that the reg. authority except medical provisions and language proficiency is performing additional selection.

Tab. 5.6.: Additional type of selection			
No.	Categories	Frequency	Percent
1	Yes	1	3,1
2	No	31	96,9
	Total	32	100,0

One institution stated that the reg. authority performs additional selection.

The following table 5.7. specifies the type of selection the government performs. The data only refer to one institution.

Tab. 5.7.: Additional type of selection			
No.	Groups	Type of selection	No. of institutions
1	Ab initio	ELP Level 4	1
2	Ready entry	ELP Level 4	1
3	FO's	ELP Level 4	1
4	Cpt.s	ELP Level 4	1

Question 22: Does your reg. authority delegate any selection in addition to ICAO medical provisions and language proficiency?

This question was answered by 31 institutions.

The following table 5.8. shows at how many institutions the reg. authority delegates selection in addition to ICAO medical provisions and language proficiency.

Does your reg. authority delegate any selection in addition to ICAO medical provisions and language proficiency?

Tab. 5.8.: Delegation of aditional selection			
No.	Categories	Frequenc	Percent
1	Yes	3	2,7
2	No	28	25,5
	Total	31	28,2

3 institutions stated, that delegations happen. 28 institutions stated, that this does not happen.

The following table 5.9. tells, which type of examinations is delegated by the reg. authority for the different groups.

The data refer to one institution.

Tab. 5.9.: Delegation of selection by the reg. authority		
Category: Group	ELP Level 4	Language proficiency assessment
Ab Initios	1	1
Ready Entries	1	1
FO's	1	0
Cpt.s	1	1

Question 23: Does your reg. authority supervise any selection in addition to ICAO medical provisions and language proficiency?

This question was answered by 31 institutions.

The following table 5.10. tells, at how many institutions the reg. authority supervises selection according to certain criteria.

Tab. 5.10.: Supervision of selection by the government			
No.	Categories	Frequency	Percent
1	Yes	4	3,6
2	No	27	24,5
	Total	31	28,2

4 institutions reported that the reg. authority supervises selection in addition to ICAO medical provisions and language proficiency. In 27 cases the institutions denied any supervision by the reg. authority.

The following table 5.11. specifies the statements of the 4 institutions, which confirm supervision.

Tab. 5.11.: Specification of supervised selection			
No.	Groups	Type of selection	No. of institutions
1	Ab initio	ELP Level 4	1
2	Ready entry	ELP Level 4	1
3	FO's	ELP Level 4	1
4	Cpt.s	ELP Level 4	1

6. Specification of the Selection Concept with Regard to Special Groups

Question 24: Do you employ foreign nationals?

This question was answered by 31 institutions.

The following table 6.1. shows how many institutions employ foreign nationals.

Do you employ foreign nationals?

Tab. 6.1.: Foreign nationals			
No.	Categories	Frequenc	Percent
1	Yes	24	77,4
2	No	7	22,6
	Total	31	100,0

24 institutions employ foreign nationals. 7 institutions do not employ foreign nationals.

The following table 6.2. gives an overview of how many institutions employ foreign candidates according to which conditions.

Survey: Ab Initio: : Do you employ foreign nationals?

Tab. 6.2.: Survey								
	Ab-initio	Frequency	Ready entry	Frequency	FO's	Frequency	Cpt.s	Frequency
1	All Nations	1	Belgiums (who speak Dutch)	1	All nationalities meeting our requirements	1	5	1
2	Belgiums (who speak Dutch)	1	EEC	1	All Nations	1	Austrian	1
3	D,....	1	EU	1	Any allowed to work in the United States	1	CAPTAINS ONLY	1
4	EEC	1	EU citizens	1	Currently (Taiwan, Europe)	1	Currently (Europe, Southeast Asia, South America, United States)	1
5	Malaysia, India, HK, UK, Aus	1	Malaysia, India, HK, UK, Aus	1	D, F,UK.....	1	D,F,UK,I,S,.....	1
6	None	1	None	1	EEC	1	EU	1
7	USA, Korea	2	Short term contracts only	1	EU	1	From many countries	1
8	various	1	Various	1	EU citizens	1	More than 50 nationalities	1
9			Yes	1	From many countries	1	UK, GER, FRA	1

Tab. 6.2.: Survey								
	Ab-initio	Frequency	Ready entry	Frequency	FO's	Frequency	Cpt.s	Frequency
10					Various	1	Yes	1
11					Yes	1		

Question 24a: Is there any restriction with regard to the number of foreign nationals?

This question was answered by 31 institutions.

The following table 6.3. shows, if there are any restrictions with regard to the max. number of foreign nationals.

Tab. 6.3. Restrictions			
No	Categories	Frequency	Percent
1	0	31	100,0

All institutions stated, that there are no restrictions with regard to the number of foreign nationals who could be employed.

Question 25: Do you tailor recruitment campaigns to specific target groups?

This question was answered by 32 institutions.

The following table 6.4. shows how many institutions have specified their selection concept with regard to special target groups.

Tab. 6.4.: Recruitment campaigns			
No.	Categories	Frequency	Percent
1	Yes	9	28,1
2	No	23	71,9
	Total	32	100,0

9 institutions have adapted their selection system to the needs of special target groups. 23 institutions have not done so.

Question 26: If “yes” according to which criteria?

This question was answered by 39 institutions.

The following table 6.5. tells how often institutions have made any adaptations of their selection concept to target groups with regard to which criteria.

Survey: Criteria for adaptation to groups

Tab. 6.5.: Criteria for adaptation				
Categories	No. of institutions (Yes)	Percent (Yes)	No. of institutions (No)	Percent (No)
Gender	0	0	39	100
Career status	2	5,1	37	94,9
Military/ Civil	3	7,7	36	92,3
School levels	5	12,8	34	87,2
Ethnic groups	0	0	39	100,00
Nationality	2	5,1	37	94,9

The following table 6.6. shows, for which additional groups adaptations have been made according to additional criteria.

Other, please describe.

Tab. 6.6.: Specification of criteria			
No.	Categories	Frequency	Percent
1	0	37	33,6
2	Other, please describe.	2	1,8
	Total	39	35,5

2 of the 39 institutions who answered this question have specified their concept according to criteria, which were not mentioned in the list above.

The following table 6.7. tells the additional criteria.

Other, please describe.

Tab. 6.7.: Specification: Other			
No.	Categories	Frequency	Percent
1	Airline sponsored cadets	1	,9
2	Right to live and work in targeted base area	1	,9

Question 27: Do you address cultural diversity in your selection system?

This question was answered by 11 institutions.

The following table 6.8. tells how many institutions have made any adaptation to cultural diversities for the group of Ab Initio candidates.

Tab. 6.8.: Adaptation to cultural diversity			
No.	Categories	Frequency	Percent
1	Yes	3	2,7
2	No	8	7,3
	Total	11	10,0

3 institutions have adapted their concept to cultural diversity, 8 have not done so. It only makes sense, if any cultural diversity exists.

Question 27a: Which parameters are adapted? If “yes” according to which criteria?

The following data are based an the answers of 11 institutions.

The left column contains the parameters. In the following colums to the right are the frequencies of institutions who have adapted their concept according to the respective parameters, separately for each group.

Survey: All groups

Tab. 6.9.: Parameters adapted with regard to groups				
Categories	Ab initio	Ready entry	FO’s	Cpt.s
No. of steps for selection	3	2	2	1
Types of tests	3	2	2	1
Definition of norms	3	2	2	1
Expected minimum performance level	3	2	2	1
Organizational aspects	3	1	2	1
Time for tests	2	1	1	0
Other parameters	0	0	0	0

For this question none of the institutions used any category, which has not been offered by the list in the questionnaire.

Question 28: Based on which criteria did you adapt your selection concept to cultural diversity?

The following table 6.10. tells how often institutions have adapted their concept to cultural diversity according to which criteria.
This question was answered by 4 institutions. Multiple answers were allowed.

Tab. 6.10.: The criteria according to which the adaptation was based		
Criteria based on…	No. of institutions (Yes)	No. of institutions (No)
Law	1	3
Organizational needs in company	3	1
Needs of the school/training department	2	2
Practical needs with regard to performance of groups	3	1
Empirical findings provided by scientific analysis of selection data	1	3

Other criteria? If "yes", please describe.

Tab. 6.11.: Other criteria			
No.	Categories	Frequency	Percent
1	0	110	100,0

Except the criteria which were given in the questionnaire, no additional criteria have been used by the institutions.

Question 29: Do you accept test results of other institutions?

This question was answered by 11 institutions.

The following table 6.12. offers information about the number of institutions who accept tests of other institutions.

Tab. 6.12.: Accepting test results of other institutions			
No.	Categories	Frequency	Percent
1	Yes	3	27,3
2	No	8	72,7
	Total	11	100,0

3 of 11 institutions accept test results of other institutions.

Question 29a: Are there any preconditions for the acceptance of test results provided by other institutions?

The following table 6.13. shows the number of institutions who accept test results of other institutions only under certain conditions.

Tab. 6.13.: Preconditions for acceptance			
No.	Categories	Frequency	Percent
1	Yes	4	100,0

4 of 11 institutions defined conditions under which they accept test results of other institutions.

The following table 6.14. shows the statement of the institutions about the kind of conditions.

If “yes”, which preconditions?

Tab. 6.14.: Specification of preconditions		
No.	Categories	Frequency
1	JAA operator	1
2	. A contractural agreement must exist	1
3	Passed	1

7. Evaluation of your Selection System and Structure of the Concept

Question 30: What do you consider the strengths of your selection system?

This question was answered by 12 institutions.

The following table 7.1. shows how many institutions consider which aspects of their selections systems being a strengths (answers to several categories have been allowed) .

Survey: The strengths of your selection system?

Tab. 7.1.: Strengths of selection systems

Categoreies	No. of institutions (Yes)	Percent (Yes) of n =12	No. of institutions (No)	Percent (No) of n = 12
Economy in time	4	33,3	8	66,7
Economy in costs	7	58,3	5	41,7
No. of successful candidates with regard to later career phases	6	50,00	6	50,00
Results of empirical evaluation	3	25,00	9	75,00
High reliability	9	75,00	3	25,00
High validity	7	58,3	5	41,7
Quality of the evaluation procedure	9	75,00	3	25,00
Degree of automation	3	25,00	9	75,00
Combination of tests	7	58,3	5	41,7
Flexibility for different groups	3	25,00	9	75,0
Requirements for test operator qualification	1	8,3	11	91,7

Most frequently methodical criteria are considered a strengths (high reliability; quality of the evaluation procedure; high validity) of the selection systems. Then criteria like „economy“ and „combination of tests are following.

Economic criteria play a substatial role.

The criterion „no. of successful candidates with regard to later career steps“ (n = 6) is also substantial .
9 of 12 institutions consider high reliability a special strength of their selection system.

7 of 12 institutions consider high validity a special strength of their selection systems.

9 of 12 institutions consider the results of the empirical evaluation a special strength of their selection systems.

The following table 7.2. contains a statement about the strengthes of selection systems refering to criteria, other than the categories mentioned in table 7.1.

Other strengths, please describe.

Tab. 7.2.: Other strengths

No.	Categories	Frequency	Percent
1	Tailored to our operations and corporate culture	1	,9

Question 31: What do you consider the weaknesses of your selection system?

This question was answered by 11 institutions.

The following table 7.3. shows the number of institutions who consider some aspects as weaknesses of their selection system.

Survey: Weaknesses of the selection system

Tab. 7.3.: Weaknesses of selection systems	
Categories	No. of institutions
Economy in time	4
Economy in costs	3
No. of successful candidates with regard to later career phases	0
Results of empirical evaluation	0
Low reliability	0
Low validity	0
Quality of the evaluation procedure	0
Degree of automation	5
Combination of tests	1
Flexibility for different groups	2
Requirements for test operator qualification	9

Most frequently "requirements for test operator qualification" was mentioned as a weakness of systems (n = 9). Then a low degree of automation was mentioned (n = 5). Lack of economy in time was mentioned 4 times as a criterion.

The following table 7.4. contains an additional category, which was introduced by an institution in order to describe a weakness of its system.

Other weaknesses, please describe

Tab. 7.4.: Other weaknesses			
No.	Cathegory	Frequency	Percent
1	Test conducted in English only	1	,9

8. Lessons Learned and Changes made

Question 32: Did you make significant changes to your selection system in recent years?

This question was answered by 11 institutions.

The following table 8.1. shows how many institutions have performed significant changes of their selection systems.

Did you make significant changes to your selection system in the past?

Tab. 8.1.: Significant changes			
No.	Categories	Frequency	Percent
1	Yes	9	81,8
2	No	2	18,2
	Total	11	100,0

9 of 11 institutions have performed significant changes.

Question 32.A: What have been your lessons learned?

This question was answered by 9 institutions.

The following table 8.2. gives an overview of the "lessons learned", which have been the reasons for the institutions to perform the changes.

Tab. 8.2.: Lessons learned

No.	Categories	Frequency
1	Adaptation to emphasize evaluation of working in unstructured environments after having changed our sim training to include more unstructured (no specific checklist available) events requiring application of past learnt system knowledge and basic flying skill	1
2	Cognitive testing should be in home language if not English	1
3	I took my military experience into our company	1
4	Job profiles in aviation have changed	1
5	Multi candidate assessment group exercise	1
6	Omitment of grading and psycho tests for pilots graduated at own ATO. The quality of the school in such, that that's not required anymore. Results within the connected airline are good and steady.	1
7	Situation awareness	1
8	Update norms, validity analysis, attrition analysis, training of selection panel members	1
9	We found that the best for our selection process is the combination of references research, interview and the simulator assessment	1

Question 32.B: With regard to which parameters did you make changes (several answers possible)?

This question was answered by 10 institutions.

The following table 8.3. shows how many institutions have performed changes with regard to which aspects of their selection systems.

Survey: With regard to which parameters did you make changes (several answers possible)?

Tab. 8.3.: Parameters according to which changes have been made

Categories	No. of institutions (Yes)	Percent (Yes) of n = 10	No. of institutions (No)	Percent (No) of n = 10
Economy in time	2	20,00	8	80,00
Economy in costs	2	20,00	8	80,00
Optimization of rate of successful candidates in later career phases	2	20,00	8	80,00
Empirical evaluation	3	30,00	7	70,00
Optimization of reliability	5	50,00	5	50,00
Optimization of validity	5	50,00	5	50,00
Optimization of the evaluation procedure	4	40,00	6	60,00
Degree of automation	3	30,00	7	70,00
Combination of tests	4	40,00	6	60,00
Flexibility of different groups	2	20,00	8	80,00
Requirements for test-operator qualification	0	0	10	100,00

Optimizations of methodic aspects are the most frequent changes.

The following table 8.4. contains an additional category which was introduced by one institution.

Other parameters?

Tab. 8.4.: Other parameters			
No.	Categories	Frequency	Percent
1	Ab Initio cadets test should include practical exercise in basic FTD replicating piston trainer to determine level of "mechanical intuition" and ability to divide attention operating machinery not necessarily flying	1	,9

Question 33: If you could, would you make any changes to your selection system?

This question was answered by 11 institutions.

The following table 8.5. shows how many institutions would perform any changes if they could.

If you could, would you make any changes to your selection system?

Tab. 8.5.: Changes whished to be done			
No.	Categories	Frequency	Percent
1	Yes	6	54,5
2	No	5	45,5
	Total	11	100,0

6 institutions would perform changes of their selection system if they had the possibility to do so. 5 institutions do not see any need for changes.

The following table 8.6. contains the type of changes which would be performed by the institutions.

If "yes", what have been your lessons learned?

Tab. 8.6.: Lessons learned			
No.	Categories	Frequency	Percent
1	Automation	1	,9
2	If cadets are ESL then tests should in home language add FTD practical exercise	1	,9
3	Improve user interface. Though not critical but good to have.	1	,9
4	More like the military tests	1	,9
5	Regard future developments like MPL	1	,9
6	Would add the mandatory simulator assessment	1	,9

The following table 8.7. contains the categories and frequencies of institutions with regard to the type of changes they would perform.

Survey: If you could, would you make any changes to your selection system?

Tab. 8.7.: Changes wished to be done				
Categories	No. of institutions (Yes)	Percent (Yes)	No. of institutions (No)	Percent (No)
Economy in time	3	42,9	4	57,1
Economy in costs	3	42,9	4	57,1
Optimization of rate of successful candidates in later career phases	3	42,9	4	57,1
Empirical evaluation	2	28,6	5	71,4
Optimization of reliability	3	42,9	4	57,1
Optimization of validity	4	57,1	3	42,9
Optimization of the evaluation procedure	3	42,9	4	57,1
Degree of automation	2	29,6	5	71,4
Combination of tests	5	71,4	2	28,6
Flexibility of different groups	2	28,6	5	71,4
Requirements for test-operator qualification	1	14,3	6	85,7

The following table 8.8. shows how many institutions would like to change their selection system according to categories which were not mentioned in the above list.

Other parameters?

Tab. 8.8.: Other parameters			
No.	Categories	Frequency	Percent
1	0	110	100,0

No additional category was introduced by the institutions with regard to the type of changes.

Question 34: Do you have data about empirical evaluation of your measuring dimensions/ tests/test battery?

This question was answered by 10 institutions.

The following table 8.9. contains the results about the number of institutions who have data about empirical evaluation of the measuring categories of their system.

Do you have data about empirical evaluation of your measuring dimensions/tests/test battery? If "yes", please specify.

Tab. 8.9.: Data about empirical evaluation			
No.	Categories	Frequency	Percent
1	Yes	5	50,0
2	No	5	50,0
	Total	10	100,0

5 of 10 institutions who answered this question have empirical data about measuring dimensions/tests/batteries.

The following table 8.10. gives a survey on types of measuring dimensions/tests/batteries they have data about, for the groups separately.

Survey: Do you have data about empirical evaluation of your measuring dimensions/ tests/test battery?

Tab. 8.10.: Specification of data about empirical evaluation		
Focus of evaluation	Measuring dimension/test/test battery	Frequency
	Ab Initio	
Tests/test battery	COMPASS score	1
	Composite score	1
	COMPASS & 10P	1
Reliability	0,75	1
	80% if expert English~50% if IOAC 4	1
Predictive validity	0,35	1
	80% if expert English~50% if IOAC 4	1
	97%	1
	We have several internal and external publications	1
	Ready Entry	
Measuring dimensions	Composite score	1
Realiability	0,75	1
Predictive validity	0,35	1
	FO's	
Measuring dimensions	0	0
Tests/test battery	0	0
Reliability	0	0
Predictive validity	0	0
	Cpt.s	
Measuring dimensions	0	0
Tests/test battery	0	0
Reliability	0	0
Predictive validity	0	0

For FO's and Cpt.s there are no data about empirical evaluation of measuring dimensions/tests/batteries.

The following table 8.11. contains specifications about the types of data based on empirical evaluation. It allows the comparision of the groups for which at the 4 institutions who answered the question a test system is available.

Question 34: Specifications with regard to the type of data on emirical evaluation

8.11.: Specifications about type of data								
	Groups				Types of methodical criteria			
Case No.	Ab Initio	Ready entry,	FOs	Cpt.s	Reliability	Predictive validity	Measuring dimensions	Tests/Test battery
1	Ab Initio	Ready entry, l.e.	0	Cpt.s	0.75	0.35	composite score	–
2	Ab Initio	0	0	0	0	80% if expert English~50% if ICAO 4	0	0
3	Ab initio	Ready entry, l.e.	FOs	Cpt.s	0	publications	0	0
4	Ab Initio	0	FOs	0	0	97%	0	0

So in rare cases empirical data on reliability of measuring dimensions (case number 1: R = 0.75) and data on predicitive validity (case number 1: R = 0.35) of measuring dimensions/tests/batteries are available. Furthermore data on hit rates (case number 2: range between 50% and 80% and 97%) are available at 1 institution. 1 institution mentions her publications with regard to this subject.

The results of question 35 were presented at the beginning of the report (see: table IV.1.).

9. Specifications with Regard to Characteristics of the Own Company

Question 36: Is your selection system tailored in a special way to your type of operation?

This question was answered by 11 institutions.

The following table 9.1. contains the number of institutions, who have adapted their selection system to their type(s) of operation.

Is your selection system tailored in a special way to your type of operation?

Tab. 9.1.: Tailoring of system to type of operation(s)			
No.	Categories	Frequenc	Percent
1	Yes	5	45,5
2	No	6	54,5
	Total	11	100,0

At 5 of 11 institutions the selection system is tailored in a special way to the type of their operation.

Question 37: If "yes", according to which special characteristics of your operation is your selection tailored?

This question was answered by 5 institutions.

The following table 9.2. shows according to which special features of the operation the system has been adapted.

Tab. 9.2.: Type of characteristics the system has been tailored for			
No.	Categories	Frequency	Percent
1	Bridge course at the flight academy is given on the same type of aircraft as the initial type within the airline (if hired). The results are used iso a seperate grading	1	,9
2	Commercial airline operations	1	,9
3	Company safety culture, team redundancy	1	,9
4	Emphasizes the need for seeing the whole picture of the operation, not only the pilot's view. We evaluate the candidates for their aptitude to contribute to all aspects of the operation (working on projects, taking over postholder positions)	1	,9
5	We "tailor" our selection procedure for every customer. Which means different profiles, languages, test procedures and result reporting.	1	,9

Question 38: Which requirements in the selection concept cover the special characteristics of your operation?

This question was answered by 8 institutions.

The following table 9.3. contains data about the the requirement dimensions which have been the reason for the adaptation.

Tab. 9.3.: Requirements of selection system covering the characteristics			
No.	Categories	Frequency	Percent
1	Ability to work an unknown problem and ability to present topics to an auditorium	1	,9
2	Assessment centre, team cooperation and communication, adherance to procedures, commandability	1	,9
3	English fluency	1	,9
4	English language proficiency	1	,9
5	For Capts, relevant experience. For Ab Initio level, assessment of aptitude and attitude via biodata, selection tests, and interviews.	1	,9
6	Good cooperation between the ATO and the airline	1	,9
7	None	1	,9
8	We do not have an own operation.	1	,9

Question 39: Do you distinguish in your selection system between psychologically based requirements and requirements which are due to the special interests/needs of your company?

This question was answered by 11 institutions.

The following table 9.4. contains data about the number of institutions who differentiate between psychologically based requirements and requirements which are based on special interests/needs of the company.

Tab. 9.4.: Psychological and administrative requirements			
No.	Categories	Frequency	Percent
1	Yes	4	36,4
2	No	7	63,6
	Total	11	100,0

4 institutions differentiate between the types of requirements.

Question 40: If "yes", please describe the requirements resulting from special interests/ needs of the company/ops.

This question was answered by 3 institutions.

The following table 9.5 describes the requirements which are integrated in the selection system according to the needs of the company.

Survey: If "yes", please describe the requirements resulting from special interests/ needs of the company/ops.

Tab. 9.5.: Specification of requirements of the company			
No.	Categories	Frequency	Percent
1	Empirically determined, eg., factors relevant to passing ground school and actual flying.	1	,9
2	Two step selection 1.) general abilities 2.) company specific requirements	1	,9
3	We have e.g. as customers also international Airforces with special needs.	1	,9

Question 41: Do you address any specific characteristics of your target groups in the concept of your selection systems?

This question was answered by 10 institutions.

The following table 9.6. shows how many institutions shape their concept of selection according to the specific features of the target groups.

Tab. 9.6.: Specific characteristics of the target groups addressed by your concept of selection systems?			
No.	Categories	Frequency	Percent
1	Yes	6	60,0
2	No	4	40,0
	Total	10	100,0

6 institutions told that they address their selection concept to specific features of the target group. 4 do not do so.

The following table 9.7. describes how many institutions have adapted their concept with regard to which criteria.

This question was answered by 8 institutions.

Survey: Which type of characteristics do you address in the concept of your selection systems? (Per group)

Tab. 9.7.: Characteristics of candidates, addressed by selection concept		
Characteristics	No. of institutions (Yes)	No. of institutions (No)
Ab Initio		
Gender	2	6
Age	5	3
Language	5	3
School level	6	2
School marks	3	5
Nationality	3	5
Ethnic group	0	0

Tab. 9.7.: Characteristics of candidates, addressed by selection concept		
Characteristics	No. of institutions (Yes)	No. of institutions (No)
Flying hours	2	6
ATPL	1	7
Instructor Rating	0	0
Type Rating	0	0
Ready Entry		
Gender	2	6
Age	3	5
Language	5	3
School level	4	4
School marks	2	6
Nationality	2	6
Ethnic group	0	0
Flying hours	6	2
ATPL	4	4
Instructor Rating	0	0
Type Rating	1	7
FO's		
Gender	0	0
Age	2	6
Language	2	6
School level	1	7
School marks	0	0
Nationality	1	7
Ethnic group	0	0
Flying hours	2	6
ATPL	2	6
Instructor Rating	0	0
Type Rating	0	0
Cpt.s		
Gender	2	6
Age	3	5
Language	3	5
School level	0	0
School marks	0	0
Nationality	2	6
Ethnic group	0	0
Flying hours	3	5
ATPL	3	5
Instructor Rating	0	0
Type Rating	2	6

In the Ab Initio group age, language and school level play the most important role.
In the Ready Entry group language, school level, flying hours and ATPL play the most important role. The same criteria are the most important ones in the groups of the FO's and the Cpt.s.

The following table 9.8. describes additional criteria which were not considered in the list above.

Ab initio: Other characteristics?

Tab. 9.8.: Other characteristics			
No.	Categories	Frequency	Percent
1	Eye hand coordination; ability to divide attention	1	,9

For the other groups no additional criteria were introduced.

Question 42: In which way do you adapt your selection concept to these characteristics?

This question was answered by 12 institutions.

The following table 9.9. contains data about the question in which way the selection systems have been adapted to the special characteristics of the target groups.

Survey: Modes of adaptation

Tab. 9.9.: Modes of adaptation				
Categories	No. of institutions (Yes)	Percent (Yes) of n = 12	No. of institutions (No)	Percent (No) of n = 12
Selection of type of tests/requirement dimensions	7	58,3	5	41,7
Number of tests	5	41,7	7	58,3
Type or number of selection phases	4	33,3	8	66,7
Definition of norms	3	25,00	9	75,00
Language of tests	3	25,00	9	75,00
Preconditions for being accepted for the tests	7	58,3	5	41,7

Most frequently the “preconditions” for the candidates (n = 7) to be accepted for the tests” are adapted to the target groups. Furthermore the type of “requirement dimensions” (n = 7) and the number of tests (n = 5) are adapted. Also the types and numbers of the selection phases (n = 4) are accounted for. Language tests (n = 3) and nor ms (n = 3) most seldomly play a role.

The following table 9.10. shows how many institutions have performed an adaptation according to additional criteria not included in the list above.

Other ways? If "yes", please describe.

Tab. 9.10.: Specification: Other modes			
No.	Categories	Frequency	Percent
1	0	110	100,0

None of the institutions has performed an adaptation according to additional criteria.

10. Methodical Aspects of your Selection System

Question 43: Which type of selection instruments do you use for the different groups?

12 of 110 institutions who logged in to the questionnaire answered the questions which refer to the use of a selection system.

The following tables 10.1. and 10.2. contain a survey on how many institutions use which types of selection instruments for the different groups.

Survey: Which type of selection instruments do you use for the different groups?

Tab. 10.1.: Type of selection system used for the different groups (part 1)

	Instruments					
Groups	Questionnairs	Free style interviews	Semi standardized Interviews	Paper-Pencil tests (psychomtric)	Apparatus tests (psychometric)	PC-based tests (psychometric)
Ab Initio	7	4	7	3	4	6
Ready Entry	8	3	5	3	3	5
FO's	6	4	5	3	3	4
Capt.s	4	3	3	2	1	2
Sums	25	14	20	11	11	17

Tab. 10.2.: Type of selection system used for the different groups (part 2)

Groups	Groups	Simulation based worksamples	Simulation based psychometric tests	Fixed base simulator	Full flight simulator
Ab Initio	5	3	1	1	0
Ready Entry	5	3	2	0	4
FO's	6	1	1	0	4
Capt.s	3	1	1	0	3
Sums	19	8	5	1	11

Questionnaires (n = 25) are used most frequently.
Semi standardized interviews (n = 20) follow on the second rank.
Groups (n = 19) also are used quite frequently.
PC-based psychomtric tests (n = 17) also are mentioned with a substantial frequency.
Psychometric based apparatus are mentioned n = 11 times.
Full flight Simulators show the same frequency (n = 11).
Work Samples are mentioned n = 8 times.

For Ab Initio and Ready Entry candidates no additional instruments were mentioned. For FO's and Cpt.s additional instruments were introduced: for FO's "presentation of behavioral scenarios" in 1 case and for Cpt.`s "presentation of behavioral scenarios" in 1 case.

The following table 10.3. gives a survey on combinations of the used selection instruments with regard to institutions and groups. Within the columns 1-12 are the institutions and the rows show the groups and the instruments.

Survey: Selection instruments, goups and institutions in combination

Tab. 10.3.: Selection instruments, groups and institutions in combination												
Case Numbers →	1	2	3	4	5	6	7	8	9	10	11	12
Criterion: Groups	Questionnaires											
Ab Initio	1	1	0	0	1	1	0	1	0	1	0	1
Ready Entry	1	1	0	1	0	1	0	1	1	1	0	1
FO's	0	0	0	1	1	1	1	0	0	1	0	1
Cpt.s	1	0	0	1	0	1	1	0	0	0	0	0
	Free style interviews											
Ab Initio	0	0	1	0	1	0	0	1	1	0	0	0
Ready Entry	0	0	0	1	0	0	0	1	1	0	0	0
FO's	0	1	0	1	1	0	1	0	0	0	0	0
Cpt.s	0	1	0	1	0	0	1	0	0	0	0	0
	Semi standardized interviews											
Ab Initio	1	1	1	0	1	1	0	0	0	1	0	1
Ready Entry	1	1	0	0	0	1	0	0	0	1	0	1
FO's	0	0	0	0	1	1	1	0	0	1	0	1
Cpt.s	1	0	0	0	0	1	1	0	0	0	0	0
	Group scenario for social abilities (CRM)											
Ab Initio	0	0	1	0	1	1	0	0	0	1	0	1
Ready Entry	0	0	0	1	0	1	0	0	1	1	0	1
FO's	0	0	0	1	1	1	1	0	0	1	0	1
Cpt.s	0	0	0	1	0	1	1	0	0	0	0	0
	Psychometric paper pencil tests											
Ab Initio	0	0	0	0	0	1	0	1	0	1	0	0
Ready Entry	0	0	0	0	0	1	0	0	1	1	0	0
FO's	0	0	0	0	0	1	1	0	0	1	0	0
Cpt.s	0	0	0	0	0	1	1	0	0	0	0	0
	Psychometric apparatus tests											
Ab Initio	0	0	1	0	1	1	0	0	0	0	0	1
Ready Entry	0	0	0	0	0	1	0	0	1	0	0	1
FO's	0	0	0	0	1	1	0	0	0	0	0	1
Cpt.s	0	0	0	0	0	1	0	0	0	0	0	0
	PC based psychometric tests											
Ab Initio	1	1	1	0	0	1	0	0	0	1	0	1
Ready Entry	1	0	0	0	0	1	0	0	1	1	0	1
FO's	0	0	0	0	0	1	1	0	0	1	0	1
Cpt.s	0	0	0	0	0	1	1	0	0	0	0	0
	Simulation based work samples											
Ab Initio	0	0	0	0	0	1	0	1	0	0	0	1
Ready Entry	0	0	0	0	0	1	0	1	1	0	0	0
FO's	0	0	0	0	0	1	0	0	0	0	0	0
Cpt.s	0	0	0	0	0	1	0	0	0	0	0	0

Tab. 10.3.: Selection instruments, groups and institutions in combination												
Case Numbers →	1	2	3	4	5	6	7	8	9	10	11	12
	Simulation based psychometric tests											
Ab Initio	0	0	0	0	0	1	0	0	0	0	0	0
Ready Entry	0	0	0	0	0	1	0	0	1	0	0	0
FO's	0	0	0	0	0	1	0	0	0	0	0	0
Cpt.s	0	0	0	0	0	1	0	0	0	0	0	0
	Fixed base simulator											
Ab Initio	0	0	1	0	0	0	0	0	0	0	0	0
Ready Entry	0	0	0	0	0	0	0	0	0	0	0	0
FO's	0	0	0	0	0	0	0	0	0	0	0	0
Cpt.s	0	0	0	0	0	0	0	0	0	0	0	0
	Full flight simulator											
Ab Initio	0	0	0	0	0	0	0	0	0	0	0	0
Ready Entry	0	1	0	1	0	0	0	0	1	0	0	1
FO's	0	1	0	1	1	0	0	0	0	0	0	1
Cpt.s	1	1	0	1	0	0	0	0	0	0	0	0

Question 44: Which grading system do you apply for the description of results in your selection system?

The following table 10.4. shows how many institutions apply which types of grading systems.
This table is based on data of 12 institutions.

Survey: Grading systems

Tab. 10.4.: Frequencies of institutions with regard to the grading systems used.			
No.	Grading systems used	No. of institutions (Yes)	No. of institutions (No)
	Ab Initio		
1	Verbal description of performance	6	6
2	Pass/fail	6	6
3	Qualitative classification in several classes	4	8
4	Rank rows	1	11
5	Percentage ranks (0-100)	3	9
6	Stanine values (1-9)	4	8
7	T-Values (0-100)	1	11
	Ready Entry		
1	Verbal description of performance	4	8
2	Pass/fail	5	7
3	Qualitative classification in several classes	3	9
4	Rank rows	1	11
5	Percentage ranks (0-100)	2	10
6	Stanine values (1-9)	4	8
7	T-Values (0-100)	1	11

Tab. 10.4.: Frequencies of institutions with regard to the grading systems used.			
No.	Grading systems used	No. of institutions (Yes)	No. of institutions (No)
	FO's		
1	Verbal description of performance	3	9
2	Pass/fail	3	9
3	Qualitative classification in several classes	2	10
4	Rank rows	0	0
5	Percentage ranks (0-100)	0	0
6	Stanine values (1-9)	3	9
7	T-Values (0-100)	0	0
	Cpt.s		
1	Verbal description of performance	2	10
2	Pass/fail	9	3
3	Qualitative classification in several classes	2	10
4	Rank rows	1	11
5	Percentage ranks (0-100)	0	0
6	Stanine values (1-9)	1	11
7	T-Values (0-100)	0	0

The types and frequencies of grading systems are varying quite strongly by comparison of the groups.

The following table 10.5. shows which combinations of grading systems are used by institutions for the different groups. In the columns 1-12 (first line) are the institutions who answered the respective question. The rows show the frequencies and types of the different grading systems by comparison of institutions and groups.

Tab. 10.5.: Grading systems and groups														
Case no. of institut. →		1	2	3	4	5	6	7	8	9	10	11	12	**Sums**
Verbal description	Ab Initio	1	0	1	0	1	0	0	1	1	1	0	0	**6**
Verbal description	Ready Entry	1	0	0	0	0	0	0	1	1	1	0	0	**4**
Verbal description	FO	0	0	0	0	1	0	1	0	0	1	0	0	**3**
Verbal description	Cpt.	1	0	0	0	0	0	1	0	0	0	0	0	**2**
Pass/Fail	Ab Initio	1	1	1	0	1	0	0	1	1	0	0	0	**6**
Pass/Fail	Ready Entry	1	1	0	1	0	0	0	1	1	0	0	0	**5**
Pass/Fail	FO	0	1	0	1	1	0	0	0	0	0	0	0	**3**
Pass/Fail	Cpt.	1	1	0	1	0	0	0	0	0	0	0	0	**3**
Qualitative classification	Ab Initio	1	0	0	0	1	0	0	1	1	0	0	0	**4**
Qualitative classification	Ready Entry	1	0	0	0	0	0	0	1	1	0	0	0	**3**
Qualitative classification	FO	0	0	0	0	1	0	1	0	0	0	0	0	**2**
Qualitative classification	Cpt.	1	0	0	0	0	0	1	0	0	0	0	0	**2**
Rank rows	Ab Initio	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Rank rows	Ready Entry	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Rank rows	FO	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Rank rows	Cpt.	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Percentage-ranks	Ab Initio	1	0	1	0	0	0	0	1	0	0	0	0	**3**

Tab. 10.5.: Grading systems and groups														
Case no. of institut. →		1	2	3	4	5	6	7	8	9	10	11	12	**Sums**
Percentage-ranks	Ready Entry	1	0	0	0	0	0	0	1	0	0	0	0	**2**
Percentage-ranks	FO	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Percentage-ranks	Cpt.	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Stanine values	Ab Initio	1	0	0	0	0	1	0	0	0	1	0	1	**4**
Stanine values	Ready Entry	1	0	0	0	0	1	0	0	0	1	0	1	**4**
Stanine values	FO	0	0	0	0	0	1	0	0	0	1	0	1	**3**
Stanine values	Cpt.	0	0	0	0	0	1	0	0	0	0	0	0	**1**
T-Values	Ab Initio	1	0	0	0	0	0	0	0	0	0	0	0	**1**
T-Values	Ready Entry	1	0	0	0	0	0	0	0	0	0	0	0	**1**
T-Values	FO	0	0	0	0	0	0	0	0	0	0	0	0	**0**
T-Values	Cpt.	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Verbal description and pass/fail play the most important role.

Question 45.A: Grading systems for flight school training

This question was answered by 6 institutions.

The following table 10.6. shows how many institutions use which types of grading systems for examinations.

Which grading system do you use for the performance evaluation in the following types (see tab. 9.7. through 9.20.) of examination?

Tab. 10.6.: Grading systems for types of examination			
No.	Categories	Frequenc	Percent
1	Pass/Fail	3	50,0
2	Qualitative classification in several classes, like: "below standard", "standard", "above standard"	3	50,0
Total	No. of institutions	6	100,0

3 institutions use pass/fail and further 3 use “qualitative classification in several classes, like: "below standard", "standard", "above standard".

The following table 10.7. contains a survey of grading systems which are used by the institutions for the evaluation of performance in flight school training.

Survey: Type of grading systems for flight school training.

Tab. 10.7.: Grading system for flight school training		
No.	Categories	Frequency of institutions
1	Verbal description of performance (strengths and weaknesses)	0
2	Pass/Fail	1
3	Qualitative classification in several classes, like: "below standard", "standard", "above standard"	0
4	Rank rows	0
5	Empirically based numerical expert rating system	0
6	Other system, please describe.	0

Except pass/fail there is no use of any additional type of grading system in flight school training.

The following table 10.8. shows a specification, delivered by one institution for the pass/fail category.

Pass/Fail

Tab. 10.8.: Specification			
No.	Categories	Frequenc	Percent
1	Competency based	1	,9

Question 45.B: Grading system for initial type rating?

This question was answered by 8 institutions (multiple answers have been allowed).

The following table 10.9. contains statements about the frequency with which institutions use different grading systems for initial type rating.

Survey: Grading systems for initial type rating.

Tab. 10.9.: Grading system for initial type rating		
No.	Category	Frequency of institutions
1	Verbal description of performance (strengths and weaknesses)	0
2	Pass/Fail	5
3	Qualitative classification in several classes, like: "below standard", "standard", "above standard"	2
4	Rank rows	1
5	Empirically based numerical expert rating system	1
6	Other system, please describe.	0

Here the variety is bigger. Pass/fail is used most frequently. Verbal description of performance (strengths and weaknesses) and “other” systems are not used for initial type rating.

The following tables 10.10. and 10.11. specify the statements to the questions above.

Pass/Fail

Tab. 10.10.: Specification			
No.	Categories	Frequenc	Percent
	1	1	,9
	Competency based	1	,9

Empirically based numerical expert rating system

Tab. 10.11.: Specification			
No.	Categories	Frequenc	Percent
	0 - 100%	1	,9

The other criteria were not specified.

Question 45.C: Grading system for LOFT scenarios in type rating

This question was answered by 7 institutions.

The following table 10.12. contains statements on how many institutions use which grading system for LOFT scenarios in type ratings.

Survey: Types of grading systems for LOFT scenarios in type rating.

Tab. 10.12.: Grading system for LOFT scenarios in type ratoing		
No.	Categories	Frequency of institutions
1	Verbal description of performance (strengths and weaknesses)	0
2	Pass/Fail	3
3	Qualitative classification in several classes, like: "below standard", "standard", "above standard"	3
4	Rank rows	1
5	Empirically based numerical expert rating system	0
6	Other system, please desribe.	0

“Pass/fail” and „qualitative classification in several classes, like: "below standard", "standard", "above standard" is mentioned 3 times each type, for LOFT scenarios. Rank rows are used in one case.

The following tables 10.13. and 10.14. specify the table 10.12. above.

Pass/Fail

Tab. 10.13.: Specification			
No.	Categories	Frequenc	Percent
1	1	1	,9
2	Competency based	1	,9

The other criteria were not mentioned, except:

Rank rows

Tab. 10.14.: Specification			
No.	Categories	Frequenc	Percent
1	Excellent; 0 not acceptable (ranks)	1	,9

Question 45.D: Grading system for Line Training

This question was answered by 9 institutions.

The following table 10.15. shows how many institutions use which grading system for line training.

Survey: Type of grading systems for line training.

Tab. 10.15.: Grading system for line training		
No.	Category	Frequency of institutions
1	Verbal description of performance (strengths and weaknesses)	1
2	Pass/Fail	5
3	Qualitative classification in several classes, like: "below standard", "standard", "above standard"	3
4	Rank rows	0
5	Empirically based numerical expert rating system	0
6	Other system, please desribe.	0

Pass/fail is used 5 times, „qualitative classification in several classes“ 3 times and „verbal description of performance (strengths and weaknesses)“ 1 time. The last three categories of the list above are not used for line training.

The following table 10.16. shows a specification of a grading system used by one institution.

Qualitative classification in several classes, like: "below standard", "standard", "above standard"

Tab. 10.16.: Specification			
No.	Categories	Frequency	Percent
1	ATP standard	1	,9

Question 45.E: Grading system for Check flights

The following table 10.17. shows how many institutions use which grading system for check flights.

Survey: Types of grading systems for LOFT scenarios in check flights.

Tab. 10.17.: Grading system for LOFT scenarios check flights		
No.	Category	Frequency of institutions
1	Verbal description of performance (strengths and weaknesses)	1
2	Pass/Fail	6
3	Qualitative classification in several classes, like: "below standard", "standard", "above standard"	2
4	Rank rows	0
5	Empirically based numerical expert rating system	0
6	Other system, please desribe.	0

Pass/fail is mentioned 6 times, „qualitative classification in several classes“ 2 times and „verbal description of performance“ 1 time. The remaining systems in the list are not used for check flights.

The following tables 10.18. and 10.19. specify the statements of the table above.

Pass/Fail

Tab. 10.18.: Specification			
No.	Categories	Frequency	Percent
1	1	2	1,8

Qualitative classification in several classes, like: "below standard", "standard", "above standard"

Tab. 10.19.: Specification			
No.	Categories	Frequency	Percent
1	ATP standard	1	,9

Question 46: Are there any grading levels (positive, negative) which have obligatory consequences for the candidate?

This question was answered by 11 institutions.

The following table 10.20. indicates how many institutions use grading systems with certain levels which have obligatory consequences for the candidate.

Are there any grading levels (positive, negative) which have obligatory consequences for the candidate?

Tab. 10.20.: Obligatory consequences	
Categories	Number
Yes	9
No	2

At 9 institutions there are obligatory consequences, at 2 institutions there are not any obligatory consequences.

The following table 10.21. specifies the statements of the table above.

If "yes", please describe

Tab. 10.21.: Specifications with regard to obligatory consequences			
No.	Categories	Frequency	Percent
1	“Fail” means retrain once and retest. Another fail means termination during the initial phase of employment.	1	,9
2	For selection, just a pass/fail for checks, then pass, fail or remedial action, eg. reinforcement training.	1	,9
3	It is a Pass or Fail System. If an individual does not acquire certain level of grades we expel that individual.	1	,9
4	Low grading requires further training.	1	,9
5	Result of grading, if given.	1	,9
6	SCHOOL LEVEL AERONAUTICS QUALIFICATIONS	1	,9
7	We have fixed "cut off" scores for different groups, based on statistics.	1	,9

There are concepts, which lead directly to exclusion and concepts, which are linked with a support. The question which concept makes sense in which case depends on the type of weaknesses and is also partly answered from an operational and economical point of view.

Question 47: Do you only refuse candidates at the end of the whole selection procedure or do you decide after each step?

This question was answered by 11 institutions.

The following table 10.22. shows how many institutions make selective decisions at the end of the selection procedure or earlier.

Do you only refuse a candidate at the end of the whole selection procedure or do you decide after each step?

Tab. 10.22.: Phase for selection decisions			
No.	Categories	Frequency	Percent
1	After the whole procedure	4	36,4
2	Step by step	7	63,6
Total	No. of institutions	11	100,0

4 institutions make decisions at the end of the whole procedure, 7 institutions make decisions earlier, which means, they select in several steps.

The following table 10.23. shows after which steps the institutions make decisions in terms of the exclusion of candidates.

After which steps do you refuse unsuccessful candidates?

Tab. 10.23.: Steps after which decisions are made		
No.	Categories	Frequency
1	Application	1
2	Basic Assessment	1
3	Grading	1
4	Initial interview	1
5	Pre-selection (computer tests)	1
6	Shortlisting	1
7	Simulator Screening	1
8	AC	1
9	initial interview	1
10	Medical Check	1
11	psycho0technical tests	1
12	Second interview with HR	1
13	Simulator Screening	1
14	Stage 1 Interview	1
15	final interview and aptitude test	1
16	First day of Final Assessment	1
17	interview with the selection board	1
18	Psychological assessment	1
19	Simulator worksample	1
20	Stage 2 Interview	1
21	Interview	1
22	Management Interview	1

Tab. 10.23.: Steps after which decisions are made		
No.	Categories	Frequency
23	Medical and statutory clearances	1
24	Second day of Final Assessment	1
25	Flight Grading	1

With regard to this question only few correlations can be identified, partly due to the fact that the respective expressions are not clear, because there is no standardized categorisation of such steps.

Question 48: Are there any measuring dimensions or instruments which have an accentuated higher weight for your evaluation than other ones?

This question was answered by 11 institutions.

The following table 10.24. shows how many institutions weight particular measuring dimensions higher than others at the evaluation of the results.

Are there any measuring dimensions or instruments for selection which have an accentuated higher weight for your evaluation than other ones?

Tab. 10.24.: Measuring dimensions with higher weight			
No.	Categories	Frequency	Percent
1	Yes	3	27,3
2	No	8	72,7
Total	No. of institutions	11	100,0

3 institutions apply this approach. 8 do not apply this approach.

The following table 10.25. shows which measuring dimensions the institutions weight higher.

Survey of measuring dimensions with higher weight

Tab. 10.25.: Specifications		
No.	Measuring Dimensions	Number of institutions
1	0-100%	1
2	Manipulative skills	1
3	Multi-tasking	1
4	Situation awareness	1
5	Decision making under time	1
6	Aptitude tests for cognitive ability	1
7	Computer tests	1
8	Flight /FFS grading	1
9	interviews for interpersonal skills	1
10	Biodata for relevant life	1

Question 49: Which method for empirical evaluation did you apply?

This question was answered, depending on the different groups, by different numbers of institutions. The data is shown per group in the following table.

Question 49.A: Which method for empirical evaluation did you apply to your selection system?

The following table 10.26. shows how many institutions rely on “personal judgement of responsible staff” and on “career analyzes of exemplified candidates” in the empirical evaluation process concerning the particular groups.

Overview of methods for the different groups

Tab. 10.26.: Methods of empirical evaluation			
Groups	Personal judgement of responsible staff	Career analyzes of exemplified candidates	No. of answering institutions
Ab Initio	3	4	7
Ready	2	3	5
FO’s	3	4	7
Cpt.`s	2	2	4
Sums	10	13	0

“Career analyzes of exemplified candidates” (n = 13) is applied more often than “Personal judgement of responsible staff” (n = 10).

Question 49.B: Hit rate with regard to criteria during further career?

This question was answered, depending on the type of group, by different numbers of institutions.

The following table 10.27. indicates how many institutions rely on hit rate during further states of career as an method of empirical validation with regard to the particular groups.

Survey: Hit rate with regard to criteria during further career?

Tab. 10.27.: Hit rate			
Groups	No. of institutions (Yes)	No. of institutions (No)	Total no. of institutions
Ab initio	7	1	8
Ready	6	0	6
FO’s	4	0	4
Cpt.s	3	0	3

The following table 10.28 shows which career steps are used by how many institutions as criteria for the evaluation of the hit rate.

The data refers to the answers of 12 institutions.

Survey: Hit rate with regard to criteria during further career?

Tab. 10.28.: Hit rate			
No.	Criteria	No. institutions (yes)	No. institutions (no)
	Ab Initios		
1	Theoretical examinations	5	7
2	Flight school training	6	6
3	Type rating	3	9
4	IOE results	0	12
5	Proficiency checks	1	11
6	Upgrading	0	12
7	HR development data	1	11
8	Sickness rate	0	12
9	Other criteria	0	12
	Ready Entries		
1	Theoretical examinations	3	9
2	Flight school training	3	9
3	Type rating	5	7
4	IOE results	2	10
5	Proficiency checks	3	9
6	Upgrading	2	10
7	HR development data	1	11
8	Sickness rate	1	11
9	Other criteria	0	12
	FO's		
1	Theoretical examinations	2	10
2	Flight school training	0	12
3	Type rating	5	7
4	IOE results	3	9
5	Proficiency checks	4	8
6	Upgrading	2	10
7	HR development data	0	12
8	Sickness rate	1	11
9	Other criteria	0	12
	Cpt.s		
1	Theoretical examinations	1	11
2	Flight school training	0	12
3	Type rating	2	10
4	IOE results	2	10
5	Proficiency checks	4	8
6	Upgrading	2	10
7	HR development data	0	12
8	Sickness rate	0	12
9	Other criteria	0	12

Apart from the criteria given in the questionnaire there were not mentioned any further categories.

Question 49.C: Mathematical correlation with career data?

The question was answered by 12 institutions. It shows how many institutions use a type of mathematical correlation for the evaluation of the predictive validity of their selection system.

The following table 10.29. shows how many institutions use a mathematical correlation with career data as a predictive criterion for the different groups.

Survey: Mathematical correlation with career data?

Tab. 10.29.: Mathematical correlation with career data?		
Categories	No. of institutions	No. of institutions
Ab initio	6	0
Ready	4	0
FO's	2	1
Cpt.s	1	1

Depending on the group, this concept is used by 1 to 6 institutions. For the Cpt.s group it is used most infrequently (n = 1), for the Ab Initio group it is used most frequently (n = 6). This is also influenced by the differences in frequency, with which selection systems are applied for the different groups.

The following table 10.30. shows how often which criteria for which group is mathematically correlated with the hit rate by the particular institutions.

Survey: Mathematical correlation with career data?

Tab. 10.30.: Mathematical correlation			
No.	Categories	No. of institutions (Yes)	No. of institutions (No)
	Ab Initios		
1	Theoretical examinations	3	9
2	Flight school training	6	6
3	Type rating	3	9
4	IOE results	11	1
5	Proficiency checks	0	12
6	Upgrading	0	12
7	HR development data	0	12
8	Sickness rate	0	12
	Ready Entries		
1	Theoretical examinations	2	10
2	Flight school training	3	9
3	Type rating	4	8
4	IOE results	1	11
5	Proficiency checks	2	10
6	Upgrading	2	10
7	HR development data	1	11
8	Sickness rate	0	12

Tab. 10.30.: Mathematical correlation			
No.	Categories	No. of institutions (Yes)	No. of institutions (No)
	FO's		
1	Theoretical examinations	0	12
2	Flight school training	1	11
3	Type rating	2	10
4	IOE results	1	11
5	Proficiency checks	2	10
6	Upgrading	1	11
7	HR development data	0	12
8	Sickness rate	0	12
	Cpt.s		
1	Theoretical examinations	0	12
2	Flight school training	0	12
3	Type rating	1	11
4	IOE results	1	11
5	Proficiency checks	2	10
6	Upgrading	0	12
7	HR development data	0	12
8	Sickness rate	0	12

In the case of Ab Initio and Ready Entry candidates methodically more qualified processes appear significantly more often than in the case of FO's and Cpt.s. A reason for this could be, amongst others, that generally selection processes are applied more infrequently for these groups, but also that the types of process applied for these groups (cf. question 40) are harder to handle methodically.

Question 50: Which type of mathematical procedure did you apply for empirical evaluation?

This question was answered by 12 institutions.

The following table 10.31. shows how many institutions apply a certain mathematical method for empirical evaluation with regard to the different carreer groups.

Survey: Frequency of institutions which applied a mathematical procedure

Tab. 10.31.: Mathematical method			
Categories	No. of institutions (Yes)	Percent (Yes)	No. of institutions (No)
Ab initio	4	33,3	8
Ready entry	4	33,3	8
FO's	4	33,3	8
Cpt.s	3	25,00	9

With regard to Ab Initios, Ready Entries and FO's 4 times a certain mathematical method was applied in each case. With regard to Cpt.s a certain mathematical method was applied only 3 times.

The following table 10.32. gives a survey of the frequencies, which mathematical method was applied for the different groups by the institutions.

The data is based on the statements of 12 institutions.

Survey of results with regard to mathematical procedure in order of validation against any career criterion

Tab. 10.32.: Mathematical procedures				
Categories	Ab Initio	Ready Entry	FO's	Cpt.s
Correlation analyzes	4	3	2	1
Regression analyzes	3	3	2	1
Discriminate analyzes	4	4	4	3

Question 51: What are the failure rates during different types of Training?

Question 51.A: What are your failure rates during Ab Initio courses?

The question was answered by 7 institutions.

The following table 10.33. shows the percentage of the candidates who failed Ab Initio traing. at how many institutions.

Tab. 10.33.: Ab initio training %			
No.	Failure rates %	Frequency	Percent
1	0	1	14,3
2	2	1	14,3
3	3	1	14,3
4	5	1	14,3
5	8	1	14,3
6	10	1	14,3
7	100	1	14,3
8	Total	7	100,0

In the second colums at the left side the percentage of candidates is listetd, which did not pass the Initio Training.

Question 51.B, C, D, E: What are your failure rates during Type rating courses?

These questions were answered by different numbers of institutions depending on the type of training.

The following table 10.34. shows at how many institutions which percentages of the particular career groups do not pass the different types of training (failure rate).

The left column contains the type of training, followed by the case number of the institution, who gave the answers. The remaining columns contain the percentages for the different career groups with the number of institutions who had failures at this height.

Tab. 10.34.: Overview on failure rates

Categories	Institut.	Ab Initios %	No. Institut.	Ready Entries %	No. Institut.	FO's %	No. Institut.	Cpt.s %	No. Institut.
Type rating	1	0	1	0	2	0	2	0	2
Type rating	2	0	1	2	1	100	2	0	0
Type rating	3	100	1	0	0	0	0	0	0
Line Familiarization	1	0	1	0	1	0	2	0	2
Line Familiarization	2	3	1	5	1	10	1	5	1
Proficiency Checks	1	2	1	0	1	0	1	0	1
Proficiency Checks	2	10	1	5	1	5	1	5	1
Proficiency Checks	3	0	0	0	0	8	1	7	1
Upgrading	1	5	1	3	1	0	1	Not relevant	
Upgrading	2	100	1	0	0	4	1	0	0
Upgrading	3	0	0	0	0	5	1	0	0
Upgrading	4	0	0	0	0	10	1	0	0

11. Composition of your Selection Team

Question 52 und 53: Describe the composition of your selection team and their tasks

The questions refering to different aspects of selection in this chapter 11 is partly answered by a bigger number of institutions, than question 2 (n = 10) (see: page 7) at the beginning of the questionnaire. This may be caused by different kinds of understanding of the questions. Question 2 is focussing on a "selection concept", which means a formalized procedure like a selection system. This question (52) now is focussing on a selection team which may be responsible also for selection procedures like screening or on the job selection.
This question was answered by 11 institutions.

The following table 11.1. shows how often which types of staff are responsible for the selection. Several answers were allowed. The data are based on the answers of 11 institutions.

Survey on different types of selection staff

Tab. 11.1.: Types of selection staff	
Categories	No. of institutions
Qualified Psychologist	8
Trained staff of the psychologist or your company	7
Administration staff of your company (non0pilots)	8
Postholders (pilots). If "yes", in which function(s)?	9

8 institutions employ qualified psychologists, 7 work with trained staff of the psychologist or the company, 8 with administration staff of the company (non0pilots) and 9 with postholders (pilots).

The following table 11.2. specifies the statement about postholders by defining their special membership to any department closer. The data are based on the answers of 8 institutions.

Postholders (pilots). If "yes", in which function(s)?

Tab. 11.2.: Postholders (pilots)			
No.	Categories	Frequency	Percent
1	FOP	1	,9
2	HR-manager, Pilot Recruitment Manager,	1	,9
3	Management pilots	1	,9
4	Manager Flight Operations	1	,9
5	PILOT MANAGEMENT	1	,9
6	Training Captains	1	,9
7	TRE	1	,9
8	We work together as an expert team	1	,9

In most cases staff of the management is concerned.

The following table 11.3. shows the combination of types of staff per institution. The left column contains the case number of the institution, followed by the single functions which occur. The most right column shows the general function of the postholders in each case. The data are based on the answers of 11 institutions.

Tab. 11.3.: Combinations of types of staff

No.	Qualified Psychologists	Trained staff of the psychologist or company	Administration staff of the company	Postholders (pilots)
1	1	1	1	Management pilots
2	0	0	1	0
3	0	1	1	Training Captains
4	0	1	1	---
5	0	1	1	FOP
6	1	1	0	We work together as an expert team
7	1	1	1	Manager Flight Operations
8	1	0	1	0
9	0	0	1	HR-manager, Piolot Recruitment Manager, VP
10	1	1	0	Pilot Management
11	1	0	0	TRE

Question 54: For which functions are they responsible in the selection process?

This question was answered by 12 institutions.

The following table 11.4. shows how often which type of tasks is done by which type of staff.
The left column contains the general professional function. The following colums show how often this type of staff is responsible for which function.
So the numbers within the fields describe the number of institutions in which this particular function applies to the respective general professional function.

Survey: For which functions are they responsible in the selection process?

Tab. 11.4.: Responsibility in the selection process

Categories	Organiza-tion	Running tests	Performing interviews	Monitoring performance an evaluation in simulator	Monitoring performance and evalu-ation in groups	Data manage ment	Data interpre-tation and perfor-mance evalu-ation	Presentation of results to the candidates
Qualified Psychologi st	4	5	5	1	4	5	5	5
Trained staff of psychologi st or your company	3	6	3	1	3	3	6	1

Tab. 11.4.: Responsibility in the selection process								
Categories	Organiza-tion	Running tests	Performing interviews	Monitoring performance an evaluation in simulator	Monitoring performance and evalu-ation in groups	Data manage ment	Data interpre-tation and perfor-mance evalu-ation	Presentation of results to the candidates
Administra tion staff of your company (non-pilots)	7	2	7	0	4	5	2	3
Posthol-ders (pilots).	3	1	9	8	7	1	5	2

The postholders form the biggest group (n = 36), followed by the psychologists (n = 34) and administration staff of company (non-pilots) (n = 30). Trained staff of the psychologist form the smallest group (n = 26).

Question 54.A: Other function(s)? If "yes", please specify.

This question was answered by one institution.

The following table 11.5. contains the specification of an institution on the question about the functions (see table above).

Tab. 11.5.: Specification			
No.	Categories	Frequency	Percent
1	We have a registered training for our staff.	1	,9

Question 55: Who is performing the selection?

This question was answered by 33 institutions.

The following table 11.6. shows how many of the institutions perform selection themselves and how many cooperate with another company in terms of selection.

Who is performing the selection?

Tab. 11.6.: Who is performing the selection?			
No.	Categories	Frequency	Percent
1	My own company	25	22,7
2	Both of them (each one a part)	8	7,3
	Total	33	30,0

25 of 33 institutions who answered the question stated that their company performes the selection on its own.

8 institutions stated that they cooperated with other companies. None of the institutions stated that the selection was performed exclusively by another company.

The following table 11.7. gives a survey of the persons/departments of the own company responsible for selection, in the case of a performance without the help of another institution.

Survey: Which person/department of the company is responsible?

Tab. 11.7.: Persons/departments responsible for selection		
No.	Categories	Frequency of institutions
1	ATO Head of Training	1
2	Department in the division responsible for pilot selection	1
3	Flight Crew Recruitment Section of Flight Operations Department	1
4	Flight Operation Manager	1
5	Flight Operations	1
6	Flight Operations and Human Resources for the air carrier. Myself for my company	1
7	Flight Operations Division	1
8	Flight Operations with HR coordination	1
9	Flight OPS, Training Center	1
10	For Ab - initio: Flight Training Center For FO and Captain: Flight Crew 919	1
11	Head of Training	1
12	HR	1
13	Human Resource Department 0 responsible of the airline	1
14	Human resources / training department	1
15	Human Resources Department	1
16	Manager Crew Resources of the Crew Resources Department	1
17	Manager Pilot Recruitement and Transfer	1
18	Multiple	1
19	HUMAN RESOURCES	1
20	Selection team run by our Selection Manager	1
21	Training Manager	1

The following table 11.8. shows which person/department is responsible for performing the selection, in the case of a performance with the help of another institution.
This question was answered by 8 institutions.

Survey: Which person/department in your company is responsible for performing the selection?

Tab. 11.8.: Person/department responsible for selection		
No.	Categories	Frequency of institutions
1	Accountable Manager & Manager Flight Operations	1
2	Head of Trg. and the HR	1
3	FLIGHT OPERATION HUMAN RESOURCES	1
4	Human Resources SPL/OP Pilot Recruitment Manager	1
5	Leadership team/Human Resources	1
6	Myself and 2 others	1
7	OPS RESOURCE MANAGER	1
8	Recruitment department, management pilots	1

The following table 11.9. gives a survey of the companies, with which the institutions cooperate as service providers.

The question about the companies, with which the institutions cooperate in terms of selection, was answered by 8 institutions.

Survey: What other company contributes to performing the selection?

Tab. 11.9.: Contribution of other companies		
No.	Categories	Frequency of institutions
1	Aviation Human Factor Cente(psycho-technical tests)	1
2	DLR Germangroup for Ab Initio only	1
3	DLR Hamburg	1
4	Executive Recruiter	1
5	FTE, CTC	1
6	Interpersonal (HAM)	1
7	Moldzio & Partner Institute for Personnel Selection	1
8	Sigmar	1

Question 56: In the case your own company performs the selection partly or in total, do you have a special procedure to identify selection team members?

This question was answered by 32 institutions.

The following table 11.10. shows how many institutions have special procedures to identify their selection team members. The much bigger number of institutions who answered this question compared with qu. 2. may result from different understanding

In the case your own company performs the selection partly or in total, do you have a special procedure to identify selection team members?

Tab. 11.10.: Frequency of special procedure to identify selection team members			
No.	Categories	Frequency	Percent
1	Yes	24	75,0
2	No	8	25,0
Total	No. of institutions	32	100,0

24 institutions have such special procedures to identy their selection team members. 8 institutions do not have such special procedures.

Question 57: If “yes” in qu. 56: What is your process to identify selection team members?

This question was answered by 21 institutions.

The following table 11.11. contains the particular measures/qualifications.

Survey: What is your process to identify selection team members?

Tab. 11.11.: Process to identify selection team members?		
No.	Categories	Frequency
1	1 HR manager,1 Pilot Recruitment Manager, The vice0presidents of the "flying" units circulate as chairmen of the selection board, law, the vicepresidents of the B777, B744, B737, MD11/A330 units	1
2	Academic background and experience	1
3	Board, written in Part D	1
4	CHECK AIRMAN TYPE RATED FOR THE SPECIFIC TYPE OF AIRCRAFT WHICH THE HIRING FOR. OPERATION MANAGEMENT MEMBER	1
5	flight experience experience in human resources,management, operations experience	1
6	FOP Management Team or Selcetion Interview.	1
7	HR filter using various metrics, screening by reporting leadership, interview process	1
8	Human Resources Department of the Division selects team members	1
9	Identify best candidates. Perform training. Give them hand0on experience and only let them select with Senior Selection team member.	1
10	Instructor rating, experience, Knowing the local traditions and habits, CRM and basic psychology.	1
11	Interviews	1
12	Language Proficiency and Aero Experience	1
13	Leadership team members	1
14	Management pilot	1
15	Management staff who have undergone training	1
16	Meeting minimum qualifications which must include experience in pilot selection at an airline or flight training organization	1
17	Nomination of experienced TRE by postholder training	1
18	The interview team composed of the Assistant General Manager Aircrew, Manager Crew Resources, Crew Resources Specialist and Management Pilots.	1
19	They are pilots, TRE, TRI and staff of Flight Training Center & Flight Crew 919	1
20	They form part of Flight Operations Management Team	1
21	We choose members from branch management based on their experience and provide limited training from the human resources department.	1

Question 58: From where do they get their qualification for this function?

This question was answered by 25 institutions.

The following table 10.12. shows how the members of the selection teams get their qualification and from where.

Survey: From where do they get their qualification for this function?

Tab. 11.12.: Qualification		
Categories	No. of institutions	No. of institutions
On the job training	19	6
Experience in former functions	17	8
Special training	17	8
Regular recurrent training	5	20
Cooperation with experts	14	11

At 19 institutions the qualification takes place on the job training, at 17 institutions on the basis of experience in former functions, at 17 institutions as special training, at 5 institutions on the basis of regular recurrent training and at 14 institutions as cooperation with experts.

Other? If "yes", please describe.

Tab. 11.13.: Specification			
No.	Categories	Frequency	Percent
1	0	110	100,0

There was no other way of qualification mentioned than the given ones.

Question 59: Who decides about hiring of pilots in your company?

This question was answered by 39 institutions.

The following table 11.14. shows how often which person/group in an instituion decides about the hiring of pilots.

Survey: Who decides about hiring of pilots in your company?

Tab. 11.14.: Who decides about hiring of pilots in your company?		
Categories	No. of institutions	No. of institutions
Selection team	24	15
Management of the airline	4	35
HR-responsible of the airline	10	29
Pilots (Postholders)	13	26

In 24 institutions the decision is made by the selection team, in 4 cases it is made by the management, in 10 cases it is made by the HR-responsible and in 13 cases it is made by pilots in respective functions.

The following table 11.19. contains further specification about who makes the hiring decision.

Other? If "yes", please describe.

Tab. 11.19.: Specification		
No.	Categories	Frequency
1	The Recruitment Selection Panel, members include Assistant General Manager Aircrew, Manager Crew Resources, Chief Pilot and Manager Flying Training.	1

This specification was made by one institution.

Question 60: Is the decision (hiring) solely based on results of the pilot selection system?

This question was answered by 32 institutions.

The following table 11.20. shows at how many institutions the decision is solely based on results of the pilot selection system.

Tab. 11.20.: Base of selection decision			
No.	Categories	Frequency	Percent
1	Yes	23	71,9
2	No	9	28,1
Total	No. of institutions	32	100,0

23 institutions answered this question with „yes“, 9 institutions answered this question with „no“.

Question 61: Which additional factors influence the hiring decisions?

This question was answered by 38 institutions.

The following table 11.21. shows how often institutions take which additional factors for the hiring decision into account.

Survey:

Tab. 11.21.: Additional influences on the hiring decision			
No.	Categories	No. of institutions (Yes)	No. of institutions (No)
Ab Initio			
1	Availability of applicants (time)	8	30
2	Flying experience	6	32
3	Salary, requested by the applicant	0	38
4	Administrative aspects	5	33
5	Legal aspects	6	32
Ready Entry			
1	Availability of applicants (time)	7	31
2	Flying experience	5	33
3	Salary, requisted by the applicant	0	38
4	Administrative aspects	2	36
5	Legal aspects	2	36

Tab. 11.21.: Additional influences on the hiring decision			
No.	Categories	No. of institutions (Yes)	No. of institutions (No)
FO's			
1	Availability of applicants (time)	11	27
2	Flying experience	17	21
3	Salary, requested by the applicant	7	31
4	Administrative aspects	6	32
5	Legal aspects	8	30
Cpt.s			
1	Availability of applicants (time)	10	28
2	Flying experience	13	25
3	Salary, requested by the applicant	8	30
4	Administrative aspects	5	33
5	Legal aspects	7	31

Question 61.A: Other factors? If "yes", please describe.

The following tables 11.22. – 11.25. show for each group separately, which additional factors play a role for the hiring decision.

Ab Initio

Tab. 11.22.: Specification			
No.	Categories	Frequenc	Percent
1	DLR PASS	1	,9
2	English Test / Personality Test	1	,9
3	Regulator approval	1	,9
4	Results of the training course	1	,9

Ready Entry

Tab. 11.23.: Specification			
No.	Categories	Frequenc	Percent
1	Results of the grading, Psycho-test and the interview with the selection board	1	,9

FO's

Tab. 11.24.: Specification			
No.	Categories	Frequenc	Percent
1	Background reference check	1	,9
2	Relevant other qualifications beyond flying experience, i.e. academic formation	1	,9
3	TYPE RATED	1	,9

Cpt.s

Tab. 11.25.: Specification			
No.	Categories	Frequenc	Percent
1	Relevant other qualifications beyond flying experience, i.e. academic formation	1	,9
2	TYPE RATED	1	,9

12. Requirement Dimensions and Selection Procedure

Question 62: In which way did you define the requirement dimensions of your selection system?

This question was answered by 12 institutions.

The following table 12.1. shows how often the requirement dimensions of the selection systems are defined according to which criteria.

Survey: Definition of requirement dimensions

Tab. 12.1.: Definition of requirement dimensions			
Categories	No. of institutions (Yes)	Percent (Yes)	No. of institutions (No)
Defined by the tests we use	7	58,3	5
Based on personal judgement	5	41,7	7
Based on work samples	5	41,7	7
Based on requirement definitions of airline experts	6	50,0	6
Based on scientific requirement analyzes	5	41,7	7

Methodically more challenging concepts of defintion (work samples, requirement definitions of experts, scientific requirement analyzes) appear more often than concepts, which base upon individual expertise.

Question 62.A: Other ways of definition? If “yes”, please describe!

Other factors?

Tab. 12.2.:Specification			
No.	Categories	Frequency	Percent
1	0	110	100,0

None of the institutions mentioned another way of definition.

Question 63: Who constructed the selection system? Please specify.

The following tables 12.3. – 12.7. show who constructed the respective selection system.

Individual:

This alternative was not chosen by any of the institutions.

Tab. 12.3.: Indiviual			
No.	Categories	Frequency	Percent
1	0	110	100,0

Function:

This alternative was not chosen by any of the institutions.

Tab. 12.4.: Function			
No.	Categories	Frequency	Percent
1	0	110	100,0

Department:

This alternative was chosen by 4 institutions.

Tab. 12.5.: Department			
		Frequency	Percent
1	Flight Operations	1	,9
2	Flight OPS	1	,9
3	Flight Training	1	,9
4	Human Resources	1	,9

Institution:

This alternative was chosen by 1 institution.

Tab. 12.6.: Institution			
No.	Categories	Frequency	Percent
1	Special provider	1	,9

Company:

This alternative was chosen by 2 institutions.

Tab. 12.7.: Company			
No.	Categories	Frequency	Percent
1	Airline	1	,9
2	Special provider	1	,9

Question 64: How is your selection system structured (measuring dimensions)

This question was answered by 11 institutions.

The following table 12.8. shows which types of evaluation areas/measuring dimensions are applied by how many institutions for the different groups.

Tab. 12.8.: Structure of selection system with regard to measuring areas							
Groups	Application data	Basic mental abilities	More complex pilot specific competences	Personality features	Social abilities	Fixed base simulator	Full flight simulator
Ab Initio	8	7	7	7	7	5	0
Ready Entry	5	5	4	4	4	2	2
FO's	5	5	4	5	4	1	4
Cpt.s	3	2	2	3	3	0	3

The following table 12.9. allows a comparison between the particular institutions with regard to the different carreer groups and measuring dimensions.

Tab. 12.9.: Comparison of groups with regard to the structure of the selection system											
Case Number	1	2	3	4	5	6	7	8	9	10	11
A preselection phase based on application data											
Ab Initio	Ab i.	Ab i.	Ab i.	0	Ab i.	0	Ab i.	Ab i.	Ab i.	0	Ab i.
Ready Enry	R.e.	R.e.	0	0	0	0	R.e.	R.e.	0	0	R.e.
FO	0	FOs	0	0	FOs	FOs	FOs	0	0	0	FOs
Cpt.	Cpt.s	Cpt.s	0	0	0	Cpt.s	0	0	0	0	0
A selection phase focusing on basic mental abilities											
Ab Initio	Ab i.	0	Ab i.	0	Ab i.	0	Ab i.	Ab i.	Ab i.	0	Ab i.
Ready Enry	R.e.	0	0	0	0	0	R.e.	R.e.	R.e.	0	R.e.
FO	0	0	0	0	FOs	FOs	FOs	0	FOs	0	FOs
Cpt.	Cpt.s	0	0	0	0	Cpt.s	0	0	0	0	0
A selection phase focusing on more complex, pilot specific competences											
Ab Initio	Ab i.	0	Ab i.	0	Ab i.	0	Ab i.	Ab i.	Ab i.	0	Ab i.
Ready Enry	R.e.	0	0	0	0	0	0	R.e.	R.e.	0	R.e.
FO	0	0	0	0	FOs	FOs	0	0	FOs	0	FOs
Cpt.	Cpt.s	0	0	0	0	Cpt.s	0	0	0	0	0
A selection phase focusing on personality features											
Ab Initio	Ab i.	0	Ab i.	0	Ab i.	0	Ab i.	Ab i.	Ab i.	0	Ab i.
Ready Enry	R.e.	0	0	0	0	0	0	R.e.	R.e.	0	R.e.
FO	0	0	0	FOs	FOs	FOs	0	0	FOs	0	FOs
Cpt.	Cpt.s	0	0	Cpt.s	0	Cpt.s	0	0	0	0	0
A selection phase focusing on social abilities											
Ab Initio	Ab i.	0	Ab i.	0	Ab i.	0	Ab i.	Ab i.	Ab i.	0	Ab i.
Ready Enry	R.e.	0	0	0	0	0	0	R.e.	R.e.	0	R.e.
FO	0	0	0	0	FOs	FOs	0	0	FOs	0	FOs
Cpt.	Cpt.s	0	0	0	0	Cpt.s	0	0	0	0	0

Tab. 12.9.: Comparison of groups with regard to the structure of the selection system											
Case Number	1	2	3	4	5	6	7	8	9	10	11
A selection phase on a fixed base simulator											
Ab Initio	0	0	Ab i.	0	Ab i.	0	Ab i.	Ab i.	Ab i.	0	0
Ready Enry	0	0	0	0	0	0	0	R.e.	R.e.	0	0
FO	0	0	0	0	0	0	0	0	FOs	0	0
Cpt.	0	0	0	0	0	0	0	0	0	0	0
A selection phase on a full flight simulator											
Ab Initio	0	0	0	0	0	0	0	0	0	0	0
Ready Enry	0	0	0	0	0	0	0	R.e.	0	0	R.e.
FO	0	FOs	0	FOs	FOs	0	0	0	0	0	FOs
Cpt.	Cpt.	Cpt.	0	Cpt.	0	0	0	0	0	0	0

Question 65: Do your candidates get any information about the selection procedure in advance?

This question was answered by 10 institutions.

The following table 12.10. shows at how many institutions the candidates get information about the selection procedure in advance.

Do your candidates get any information about the selection procedure in advance?

Tab. 12.10.: Information about selection procedure			
No.	Categories	Frequency	Percent
1	Yes	7	70,0
2	No	3	30,0
	Total	10	100,0

At 7 institutions the candidates get information in advance. At 3 institutions they do not get any information at this state.

The following table 12.11. shows at how many institutions the candidates of the different groups get which type of information in advance.

Details about information:

Tab. 12.11.: Details about given information							
Categories	Duration	Organization	Type of requirement dimensions	Type of tests	How to prepare	Grading system	Other?
Ab Initio	7	7	6	6	4	3	0
Ready	6	6	5	5	3	2	0
FO's	5	5	5	5	4	2	0
Cpt.s	2	2	2	1	0	0	0

Organizational information is given most frequently. Information about the type of requirement dimensions and tests is given slighty less frequently. Information about possibilities of preparation and grading systems is given least frequently.

Question 66: Do you accept preparation courses for your selection procedure?

This question was answered by 10 institutions.

The following table 12.12. shows how many institutions accept preparation courses for their selection procedure.

Do you accept preparation courses for your selection procedure?

Tab. 12.12.: Preparation courses			
No.	Categories	Frequency	Percent
1	Yes	3	30,0
2	No	7	70,0
	Total	10	100,0

3 institutions accept preparation courses. 7 institutions do not accept preparation courses.

Question 67: Do you support preparation courses for your selection procedure?

This question was answered by 11 institutions.

The following table 12.13. shows how many institutions support preparation courses for their selection procedure.

Do you support preparation courses?

Tab. 12.13.: Preparation courses			
No.	Categories	Frequency	Percent
1	Yes	1	9,1
2	No	10	90,9
	Total	11	100,0

1 institution supports such courses. 10 institutions do not support such courses.

Question 68: How many years do you keep your selection results valid (years/group) in the case you can not immediately hire the candidates and put them on a waiting list?

This question was answered by 16 institutions for the Ab Initios, by 13 institutions for the Ready Entries, by 18 institutions for the FO's and by 11 institutions for the Cpt.s.

The following table 12.14. shows at how many institutions which time spans are common for the particular groups.

Survey: How many years do you keep your selection results valid

Tab. 12.14.: Time period a selection result is kept valid				
Years	Ab initio	Ready entry	FO's	Cpt.s
0	3	5	2	2
1	4	3	6	4
2	5	4	7	3
3	2	1	1	1
4	0	0	0	0
5	2	0	1	1
6	0	0	0	0
7	0	0	1	0
Total of institutions:	16	13	18	11

The number ranges between 0 and 5 years in terms of the Ab Initios, at which 2 years obtains the highest frequency. The number ranges between 0 and 3 years in terms of the Ready Entries, at which 0 years obtains the highest frequency. The number ranges between 0 and 7 years in terms of the FO's, at which 2 years obtains the highest frequency. The number ranges between 0 and 5 years in terms of the Cpt.s, at which 1 year obtains the highest frequency.

Question 69: In which state of selection does your concept allow a prognosis concerning suitability for the captains role?

This question was answered by 11 institutions.

The following table 12.15. shows at how many institutions the selection systems allow in which states a prognosis concerning suitability for the captain's role.

Survey: Prognosis of suitability fort the Cpt.s role

Tab. 12.15.: State for prognosis concerning the suitability for the Cpt.s role			
Categories	No. of institutions (Yes)	Percent (Yes)	No. of institutions (No)
Ab initio	7	63,6	4
Ready	7	63,6	4
FO's	6	54,5	5
Cpt.s	3	27,7	8

Question 70: How is the result of your selection process presented to the candidates (several answers are possible)?

This question was answered by 37 institutions.

The following table 12.16. shows how often the institutions use which type of presentation of results toward the candidate.

Survey: Result presented to candidates

Tab. 12.16.: Presentation of selection results to the candidates			
Categories	No. of institutions (Yes)	Percent (Yes)	No. of institutions (No)
Verbal description of strengths and weaknesses	12	32,4	25
Only information about pass/fail	17	45,9	20
Only information about position in a rank row	0	0	37
Scale value/with reference to a cut off value	1	2,7	36
Profile of results with important/all dimensions	5	13,5	32

Question 70.A: Other? If “yes” please describe!

The following table 12.17. contains further ways of presentation of results.

Other? If "yes", please describe.

Tab. 12.17.: Specification			
No.	Categories	Frequenc	Percent
1	Copy of paper results goes to	1	,9
2	In case of failure an offer is made to discuss the (negative) results with the Pilot Recruitment Manager	1	,9

Question 70.B: Is the feedback given in written form or in a personal conversation?

This question was answered by 37 institutions.

The following table 12.18. shows at how many institutions feedback is given in a written form and at how many institutions feedback is given in a personal conversation.

Tab. 12.18.: Type of feedback			
No.	Categories	Frequenc	Percent
1	Written form	19	51,4
2	Personal conversation	18	48,6
	Total	37	100,0

19 institutions give feedback in a written form to the candidate. 18 institutions give feedback in a personal conversation with the candidate.

Question 71: How is the result of your selection process presented to the hiring decision maker (several answers are possible)?

This question was answered by 37 institutions.

The following table 12.19. shows how often the institutions use which type of presentation of results toward the hiring decision maker.

Survey: How is the result of your selection process presented to the hiring decision maker

Tab. 12.19.: Presentation of results to the hiring decision maker			
Categories	No. of institutions (Yes)	Percent (Yes)	No. of institutions (No)
Verbal description of strengths and weaknesses	7	18,9	30
Only information about pass/fail	3	8,1	34
Only information about position in a rank row	1	2,7	36
Scale value/with reference to a cut off value	4	10,8	33
Profile of results with important/all dimensions	11	29,7	26
All available information	20	54,1	17

Other? If "yes", please describe.

Tab. 12.20.: Specification			
No.	Categories	Frequency	Percent
1	0	110	100,0

Other types of presentation of results were not mentioned by the institutions.

Question 72: How do you ensure data protection of the selection results?

This question was answered by 8 institutions.

The following table 12.21. contains the mentioned possibilities of data protection.

Tab. 12.21.: Specification: data protection			
No.	Categories	Frequency	Percent
1	AREA RESTRICTED	1	,9
2	Data kept confidential by relevant department and supervised by manager	1	,9
3	Data Privacy Act	1	,9
4	In company HR systems and due to the small size of the group of people having access to the data	1	,9
5	Kept secured in the human resources department	1	,9
6	Managed by our selection provider	1	,9
7	Restricted Access and securing data of Information	1	,9
8	The selection results from different stages are concentrated at a specialy assigned flight OPS officer who is responsible to calculate and issuue the results of the selection	1	,9

8 institutions name explicit concepts for data protection.

Question 73: Do you perform a reference check on Ready Entry/FO/Cpt. candidates?

This question was answered by 37 institutions.

The following table 12.22. shows how many institutions perform a reference check on Ready Entry/FO/Cpt. candidates.

Do you perform a reference check on Ready Entry/FO/Cpt. candidates?

Tab. 12.22.: Reference check			
No.	Categories	Frequency	Percent
1	Yes	31	83,8
2	No	6	16,2
	Total	37	100,0

31 institutions perform such a reference check. 6 institutions do not perform such a reference check.

Question 74: Do you allow failed candidates to re-apply?

This question was answered by 10 institutions.

The following table 12.23. shows how many institutions allow failed candidates to re-apply.

Tab. 12.23.: Repetition of the Test			
No.	Categories	Frequency	Percent
1	Yes	6	60,0
2	No	4	40,0
	Total	10	100,0

6 institutions allow a repetition of the test, 4 institutions do not allow a repetition of the test.

Question 75: What are the re-applying criteria?

This question was answered by 7 institutions.

The following table 12.24. shows how often the institutions allow a re-application under which conditions.

Survey: Re-applying criteria

Tab. 12.24.: Re-applying criteria			
Categories	No. of institutions (Yes)	Percent (Yes)	No. of institutions (No)
After a certain time	5	71,4	2
Performance close to cut off criteria	2	28,6	5
Depending on the type of weakness	4	57,1	3
If weaknesses can be corrected in a certain time	3	42,9	4

The criteria are differentiated and cover a number of reasonable possibilities.

Other? If "yes", please describe.

Tab. 12.25.: Specifications			
No.	Categories	Frequency	Percent
1	0	110	100,0

None of the institutions mentioned any further criteria.

Question 76: How are re-applying candidates selected?

This question was answered by 6 candidates.

The following table 12.26. indicates how often the institutions apply which selection processes with regard to the re-applying candidates.

Tab. 12.26.: Selection of re-applying candidates			
No.	Categories	Frequenc	Percent
1	Same as the first time	4	66,7
2	Tests only for the weak points	1	16,7
3	A different test battery	1	16,7
Total	No. of institutions	6	100,0

4 institutions do not change anything in terms of the selection concept. 1 institution repeats only the tests with low achievements and 1 institution uses a different test battery.

Other? If "yes", please describe.

Tab. 12.27.: Specification			
No.	Categories	Frequency	Percent
1	0	110	100,0

None of the institutions stated further concepts.

Question 77: Do you adapt the conditions/standards/procedures during periods of high demand of pilots?

This question was answered by 10 institutions.

The following table 12.28. shows how many institutions adapt their conditions/standards/procedures in periods of high demand of pilots.

Tab. 12.28.: Number of institutions who adapt to periods of high demand of pilots			
No.	Categories	Frequency	Percent
1	Yes	2	20,0
2	No	8	80,0
Total	No. of institutions	10	100,0

2 institutions adapt their conditions/standards/procedures. 8 institutions do not adapt their conditions/standards/procedures.

Question 77A: If “yes”, in which way?

This question was answered by 11 institutions.

The following table 12.29. shows how often the institutions adapt their conditions/standards/procedures in periods of high demand of pilots in which way.

Survey: Specifications

Tab. 12.29.: Strategies of adaptation to periods of high demand of pilots				
Categories	No. of institutions (Yes)	Percent (Yes)	No. of institutions (No)	Percent (No)
Recruiting more candidates for being tested	1	9,1	10	90,9
Accepting candidates on a lower minimal performance level	1	9,1	10	90,9
Reducing requirements for career steps	0	0	11	100

Other? If "yes", please describe.

Tab. 12.30.: Specification			
No.	Categories	Frequency	Percent
1	0	110	100,0

None of the institutions mentioned further ways of adaption.

Data Source

Tab. 12.31.: Data Source			
No.	Categories	Frequency	Percent
1	1 IATA Pilot Selection Survey_Main Contact	86	78,2
2	1 IATA Pilot Selection Survey_Other Contacts	24	21,8
	Total	110	100,0

13. Quality Management

The following table 13.1. shows at how many institutions the selection concept is certified by a quality management concept.
The data is based on the answers of n = 35 institutions which perform selection themselves or with the help of other institutions.

The table 13.1. shows from the left to the right which institutions have a selection concept for which target groups, if it is incorporated in a QMS system, if the performing organization is certified and on the right side which instance maintains the selection system according to the QMS concept.

If there do not appear any values in the left columns, it is about institutions which let other institutions perform their selection.
20 institutions state that their concept is incorporated in a QMS concept. 9 institutions state that this is not the case. 6 institutions do not answer this question at all.
16 institutions state that the performing institution is certified. 9 institutions state that this is not the case. 10 institutions do not answer this question at all.

In 5 cases an individual is responsible for the maintenance. In 6 cases an official is mentioned as being responsible. In 16 cases a department is responsible. In 3 cases an instituition is mentioned as being responsible. In 6 cases a company is responsible.

There are some few double entries with regard to the categories of differentiation.

Quality Management

Tab. 13.1. Quality Management											
	Selection concept in Place/groups						Who maintains the selection system in terms of QM?				
No.	Ab Initio	Ready Entry, l.e.	FOs	Cpt.s	Is your selection system incorporated in the QMS of your company?	Is the organization performing the selection certified?	Individual	Function	Department	Institution	Company
1	.	.	.	.	Yes	Yes					
2	.	.	.	.	Yes	No	.	Flight operations manager	AirService	.	.
3	.	.	.	.	Yes	No	Manager Pilot Recruitment	.	.	.	.
4	Ab initio	Ready entry, l.e.	0	Cpt.s	Yes	Yes	.	.	Division HR	.	.
5	Ab initio	Ready entry, l.e.	FOs	Cpt.s	Yes	No	.	.	Flight Planning Department(F/O, CPT), Human Resources Department (Ab Initio, Ready Entry)	.	.
6	.	.	.	.	Yes	No	.	.	.	.	.
7	.	.	.	.	No	Yes	.	.	flight OPS	.	.
8	.	.	.	.	Yes	Yes	.	.	.	.	.
9	Ab initio	0	0	0	Yes	Yes	.	.	.	.	provider
10	0	0	0	0	Yes	Yes	.	.	.	.	.
11	.	.	.	.	Yes	.		training manager	training	.	.
12	.	.	.	.	Yes	Yes	Yes	Coordinator	Human Resourses	Airline	Airline
13	0	Ready entry, l.e.	FOs	Cpt.s	No	.	.	.	.	.	.
14	.	.	.	.	Yes	Yes	.	.	OPERATIO N DEPATMEN T AND HR	.	.
15	.	.	.	.	No	Yes	.	.	Flight Operations	.	.
16	.	.	.	.	No	No	.	.	Pilot Selection	.	.
17	.	.	.	.	Yes	Yes	.	.	.	.	.
18	.	.	.	.	No	.	.	.	.	.	.

Tab. 13.1. Quality Management											
	Selection concept in Place/groups						Who maintains the selection system in terms of QM?				
No.	Ab Initio	Ready Entry, l.e.	FOs	Cpt.s	Is your selection system incorporated in the QMS of your company?	Is the organization performing the selection certified?	Individual	Function	Department	Institution	Company
19	.	.	.	.	.	.	Manager Crew Resources	.	Crew Resources	.	.
20	Ab initio	0	FOs	0	Yes	No	.	.	Flight Crew Recruitment Section	.	.
21	.	.	.	.	Yes	Yes	.	.	human resources	.	.
22	.	.	.	.	.	Yes		HT	FTO		provider
23	.	.	.	.	Yes	No	.	.	Flight Operations	.	.
24	.	.	.	.	No	No	.	.	.	.	.
25	Ab initio	Ready entry, l.e.	FOs	Cpt.s	.	.	.	.	.	.	.
26	0	0	FOs	Cpt.s	No	No	.	.	.	.	.
27	Ab initio	Ready entry, l.e.	FOs	0	.	.	.	.	.	.	.
28	.	.	.	.	Yes	Yes	Capt. Phan Xuan Duc	Executive Vice President Operations	.	.	Airline
29	.	.	.	.	Yes	.	.	.	.	provider	Airline Group
30	Ab initio	Ready entry, l.e.	0	0	.	.	.	.	.	.	.
31	Ab initio	0	FOs	0	.	.	.	.	.	.	.
32	.	.	.	.	No	Yes					
33	.	.	.	.	Yes	Yes	ROSANA C AMARO	COORDINATOR	HUMAN RESOURCES	Airline	Airline
34	.	.	.	.	No	Yes					
35	.	.	.	.	Yes	.	.	.	Human Resources Department	.	.

Attachment 1: Questionnaires filled in

No.	Part I	Part II	Part III	Summe ausgef.	3 ausgef.	2 ausgefü.	1 ausgef.
1	1	1	1	3	1		
2	1	0	0	1	.	.	1
3	1	0	0	1	.	.	1
4	1	0	0	1	.	.	1
5	1	1	0	2	.	1	
6	1	0	0	1	.	.	1
7	1	0	0	1	.	.	1
8	1	1	1	3	1	.	.
9	1	1	1	3	1	.	.
10	1	0	0	1	.	.	1
11	1	0	0	1	.	.	1
12	1	0	0	1	.	.	1
13	1	0	0	1	.	.	1
14	1	0	0	1	.	.	1
15	1	0	0	1	.	.	1
16	1	1	1	3	1	.	.
17	1	1	1	3	1	.	.
18	1	0	0	1	.	.	1
19	1	0	0	1	.	.	1
20	1	0	0	1	.	.	1
21	1	1	1	3	1	.	.
22	1	0	0	1	.	.	1
23	1	1	1	3	1	.	
24	1	0	0	1	.	.	1
25	1	0	0	1	.	.	1
26	1	0	0	1	.	.	1
27	1	1	1	3	1	.	.
28	1	0	0	1	.	.	1
29	1	0	0	1	.	.	1
30	1	1	1	3	1	.	.
31	1	1	1	3	1	.	.
32	1	0	0	1	.	.	1
33	1	0	0	1	.	.	1
34	1	0	0	1	.	.	1
35	1	0	0	1	.	.	1
36	1	1	1	3	1	.	.
37	1	0	0	1	.	.	1
38	1	0	0	1	.	.	1
39	1	0	0	1	.	.	1

No.	Part I	Part II	Part III	Summe ausgef.	3 ausgef.	2 ausgefü.	1 ausgef.
40	1	0	0	1	.	.	1
41	0	1	0	1	.	.	1
42	0	0	1	1	.	.	1
43	1	1	1	3	1	.	.
44	1	0	0	1	.	.	1
45	0	1	0	1	.	.	1
46	0	1	0	1	.	.	1
47	0	0	1	1	.	.	1
48	0	0	1	1	.	.	1
49	1	0	0	1	.	.	1
50	1	0	0	1	.	.	1
51	0	0	1	1	.	.	1
52	0	1	0	1	.	.	1
53	0	0	1	1	.	.	1
54	0	0	1	1	.	.	1
55	1	0	0	1	.	.	1
56	1	0	0	1	.	.	1
57	1	0	0	1	.	.	1
58	0	1	0	1	.	.	1
59	0	1	0	1	.	.	1
60	0	0	1	1	.	.	1
61	1	0	0	1	.	.	1
62	1	0	0	1	.	.	1
63	1	0	0	1	.	.	1
64	1	0	0	1	.	.	1
65	1	0	0	1	.	.	1
66	1	0	0	1	.	.	1
Total	53	19	19	0	12	1	53

to order :

International Air Transport Association


www.iata.org


custserv@iata.org


+1 800 71 66 32 60

+1 (514) 874 9659

Printed in Canada

ISBN 978-92-9233-779-7