

HUMAN FACTORS



Guidelines on the use of e-learning in ATM Part 1

Organisational Issues

**Guidelines on the use
of e-learning in ATM
Part 1 –
Organisational Issues**

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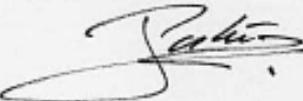
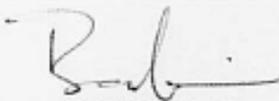
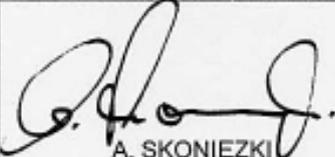
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Abstract			
<p>This is part one of a three part document on deploying e-learning in an ATM environment. Part 1 deals with the organisational issues that need to be taken into account when setting up e-learning activities at ANSPS or ANS Training Centres.</p> <p>It focuses on managerial issues such building a strategy, involving the stakeholders, Resourcing and budgeting for the activity and also on softer issues such as change management and keeping the ultimate goal in mind, i.e. that the activity is being set up to teach.</p>			
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1. INTRODUCTION

E-learning, in broader terms, can be defined as the delivery of training over an electronic network. The meaning behind the word varies in different environments and with different people.

In some environments, such as a number of universities, e-learning means providing their training material in the form of PowerPoint slides, Word documents, PDFs, or through other well known electronic formats available widely over the Internet or even locally over their network. In other environments, e-learning means using a blend of tools such as wikis¹, blogs, on-line chats, forums, emails, virtual classrooms, asynchronous computer-based training [CBT] and any tools which could be used to create a learning experience, electronically and over a network.

In European ATM, the term e-learning is generally used when talking about asynchronous CBT, even though in certain areas other tools are already being used.

2. WHAT IS THE AIM OF THESE GUIDELINES?

This document aims to give guidelines and good practice ideas to those who would like to deploy e-learning in their organisations or to those who are already using e-learning and would simply like to know more.

It is divided into three parts: The first relates to organisational issues related to e-learning, the second to pedagogic issues and the third to technical issues.

¹ These terms are defined in appendix 1

3. HOW WERE THESE GUIDELINES COMPILED?

One of the goals of EUROCONTROL's Sense programme is to enhance human performance through the sharing of information and knowledge between partners.

One of the work packages of this programme is to optimise the integration of e-learning within mainstream training in the European ATM context. Within this work package, it was decided to take the initiative in collecting and sharing knowledge of how e-learning could be used more effectively and more successfully in the ATM training environment. The information the reader will experience in this document came mainly from three sources:

- A series of three workshops was organised for the period 2006-2008 around the central theme of using e-learning. In these workshops, the main contributors are the participants themselves who, through facilitated exercises and interaction with each other, build a body of knowledge on the issue.
- Bilateral interactions between those responsible for e-learning at EUROCONTROL: the Institute of Air Navigation Services [IANS] and partners using e-learning within their curriculum.
- First hand experience gathered at IANS in delivering e-learning training and research into the use of e-learning in environments other than ATM.

4. PART 1: ORGANISATIONAL ISSUES

Organisation can be defined as the act or process of organising; while organising can be defined as the act of re-arranging elements following one or more rules. It can also be seen as the opposite of messing up²!

By organisational issues this document means all those issues which need to be taken into account when planning and deploying e-learning. In fact, the aim of this document is to achieve successful usage of e-learning in the ATM environment, which is also the opposite of messing up!

4.1 *Why organisational issues?*

E-learning is first and foremost about learning, and the elements that need to be satisfied for successful learning to take place are very similar to those in other more 'classical' learning activities. However, many have, in the past, [over]focused on the 'e' aspect of e-learning and somewhat neglected the 'learning' part.

An analogy here would be appropriate: in the case of classroom instruction, people do not spend the majority of their time discussing the building, the whiteboards and the projectors; they simply concentrate on the learning objectives and put up a structure which would help them deliver them in the most optimal way. Conversely with e-learning, people have spent a great deal of effort in the past discussing the computers, the bandwidth, the LMS, the CD-ROMs, etc. and not enough time considering elements relating to the training organisation and structure.

One of the aims of this document is to re-establish the right balance.

Also, the deployment of e-learning has its own specificities, but these specificities are of a functional nature and not necessarily of a technical one. The function which is being referred to is the fact that e-learning, especially in the definition most widely used in European ATM [see introduction, above], consists of stand-alone distance learning in front of a computer. To deploy successful learning while using this function, a particular set of organisational elements are also needed. These will be discussed in this document.

Finally, the majority of the research and literature around e-learning assumes that the adult learner works in an office during office hours in front of a computer equipped with mainstream software which is linked to the Internet. The reality of the ATC operational environment is different; controllers normally work in operations rooms or towers, in front of a dedicated Controller Working Position [CWP], not connected to the Internet and not necessarily during office hours.

This document discusses the specificity of the operational environment and provides organisational elements which can be put in place in this context.

² Definition from Wikipedia: www.wikipedia.org

4.2 Content

The organisational-issues part of the document is organised into eight sections. These sections consider different aspects of the organisation of an e-learning programme and present suggestions on how to go about taking care of each one of them. Where relevant, a special consideration of the ATM operational environment is included within the sections.

The suggestions contained in this document should be seen as guideline material which should be adapted to the local context in which it is to be applied.

4.3 Who is it aimed at?

The organisational-issues part of the document is primarily aimed at training managers who have the task of organising and deploying e-learning programmes within their administrations. General managers, tutors/instructors and others who are or will get involved in e-learning will also find useful material within this document.

5. IT IS ABOUT LEARNING

As already mentioned above, e-learning is first and foremost about learning, so the first element which needs to be considered is how to create a programme through which people can learn effectively.

The considerations which need to be kept in mind are how humans learn and more specifically how adult humans learn. It is not the aim of this document to discuss adult learning theory. There are, however, a number of factors that need to be taken into account when organising an e-learning programme. These are:

1. Motivation
2. Human centricity
3. Simplicity

5.1 *Motivation*

For learning to be efficient, the participants need to be motivated. This counts for all sorts of learning events, including e-learning.

Appropriate motivating elements should be used when organising an e-learning programme. The selection of elements needs to be customised to the context and the environment. The training manager needs to keep in mind the context, the nature of the training, the environment, the target population and the culture of the organisation, in order to propose the best motivating elements possible around a training programme.

The most important motivational element that should be kept in mind is that the programme needs to be considered relevant by the target population. They need to feel that there is something in it for them when doing the training. They must feel that they achieve something such as, for example, the possibility of applying the knowledge or skills learnt, self-improvement or maybe even the possibility of advancing in their career.

The programme could be designed in such a way as to make the students feel they have certain responsibilities associated with their learning. They could be involved in its design. The learning could be personalised and could allow for self-evaluation. It could also leave the responsibility of the 'what', 'where' and 'when' to the participant.

In some cases, learning from peers and collaborating with them, or a sense of competition with colleagues, could also enhance the motivation of the individual to study. Contact with other humans such as a tutor or an instructor [and not just with a machine] can motivate many to continue; because they do not feel isolated if get lost or encounter difficulties.

Also, even if the training is an obligatory element in the profession, such as, for example, maintaining a license, management could still show appreciation and recognition to all those who successfully complete the training. A diploma or a certificate or another type of reward could be of benefit in certain contexts.

Finally, the deployment of e-learning allows the organisation to reach its staff more quickly and the students to cover their learning more quickly; factors that in themselves, if presented properly, are also motivators.

It also generates feedback, and a commitment from management to act on the feedback can motivate the users in future situations. They will feel that their input is appreciated.

Motivation, e-learning and operational staff

In simplistic terms, in ATM, operational staff can be confronted with professional training for two reasons: the first is for personal interest and the second because it is required of them in order to maintain a valid license. In both cases those concerned need to be motivated in order to effectively benefit from the experience. This means that even in the second case, where the individual is obliged to undergo training, they still need to be motivated for them to do this effectively.

It is wrong to assume that because someone is obliged to undergo training, they will do this whole-heartedly even if they do not feel motivated. The amount of resistance, direct or indirect, experienced in a number of obligatory e-learning training courses where the element of motivation was not considered was high, and many times meant the difference between the success or failure of the e-learning programme and the removal of e-learning from the curriculum.

What could motivate operational staff?

Apart from all the generic elements which have been mentioned above, other elements which are particular to the situation are:

- Time allowed to do the training
- A link with practical exercises
- A link with real situations
- The opportunity to discuss the issues between peers

There have been a number of examples where, because the elements which needed to be studied were available anytime, any place, via the Internet, the people asked to follow the e-learning course were expected to do this in their own free time. This caused a lot of resistance and a comparatively high number of 'technical or other problems' were reported by the end-users.

On the other hand there are a number of examples of good practice where management offered incentives and flexibility to their staff to encourage the latter to do the e-learning courses. The ideas were:

- Remuneration/time recuperation related
- Schedule training time during working hours
- Schedule training time outside official working hours and compensate students in time or money
- Give compensation upfront in time or money and allow the students to plan in their learning time

Some even offered extra time off for those who finished the training before a given date!

It is highly recommended that when organising an e-learning programme, time issues like the ones described above are seriously considered. The solution, whichever it is, needs to fit the culture of the organisation and needs to be agreed with the end-users.

Link with practical exercises

Operational people are generally very practical, and even though current e-learning content is often well designed and includes a good balance of interactivity and knowledge acquisition it still lacks skill acquisition components.

It has been observed that many times, if theory is not closely followed by practice and application, the students could get alienated and eventually de-motivated.

As an example of good practice, some have:

- organised forums to discuss the issues as a follow-up to an e-learning module;
- linked the e-learning content with simulation, especially in the context of emergency and unusual situations.

As will be discussed below, a successful training programme should contain an appropriate mix of ingredients [a blend] which will ensure that learning takes place in the most effective manner. Especially in the context of an operational environment, it is of benefit to consider how to blend e-learning with other training components.

5.2 *Human centricity*

Human interactions with tutors, training managers and with peer learners are important elements in making learning motivating.

In the case of e-learning where the student is expected to learn alone in front of a computer, the lack of human interactivity can often act as a very negative factor. When organising an e-learning programme it is important to include elements where the student feels that there are other humans involved.

In the early introduction of e-learning, many thought that the interaction with a computer would be able to replace all the human interaction which was needed before. Over the years this has been proven wrong. Technology needs to be seen as a vehicle through which learning can be done and not the substitute for the driver.

Tutors/Instructors

People studying through e-learning feel much better when they know that there is a tutor available to assist them if they have questions [as they would in a class-room environment, for example]. Also, when the student needs to study a long course, it is also of benefit for the tutor to guide and structure the course for the students.

This can be done, for example, by giving milestones to the students and keeping in regular contact with them via email or via a forum. The advantage of this regular contact is that it allows the tutor to identify and assist those students who are encountering difficulties.

Peers

It makes a big difference if you are able to discuss the issues being studied with other students rather than simply working alone.

Furthermore, reinforcement, where there is doubt and even confirmation that the learner can successfully communicate the ideas being studied to others are extremely important aspects of learning.

Learning, as well as encouragement and motivation, also take place through interactions with peers. In the case of stand-alone CBT, this is difficult to achieve unless the organisation of the training programme combines it with other methods. These methods could be technology enabled, such as forums, blogs, wikis or even email exchanges which would be encouraged and moderated by the tutor. They could also be of a more 'classical' nature such as a meeting or a facilitated session to kick off, mid-way and to close a course.

When planning the organisation of a programme within which e-learning is a component, it is of benefit to consider how to encourage peer-to-peer interaction.

Training Managers

Training managers need to be accessible, to ensure that the programme is meeting its objectives and that it is being supported by management. It is important for students and instructors to know who is responsible for the training and that there is somebody who they could contact should they need to.

Training managers need to collect and act on feedback. To do this they need firstly to establish a process within the organisation of the e-learning programme by which feedback is collected, reviewed, acted upon and reported back, and secondly they need to keep up-to-date with the training progress. This means that they should not expect technology to deal with the problems by itself or that since the training is being delivered through e-learning, it is therefore a technical issue out of their control.

Practical tips to enhance the contact between the training organisation and the end-user:

- Blend the training using distance and on-site parts wherever possible.
- When starting an e-learning programme, organise a kick-off event. Depending on the importance of the event and whether the end-users are all on one site or not, you may consider:
 - organising a small session on-site to present the objectives of the training, its main features, the instructors and other relevant issues such as technical assistance, [get senior management to present it, as a token of support] or
 - organising a small on-line session if the end-users are in different locations, or at least;

- presenting the training programme, the instructors, the objectives, the deadlines, etc. in an email or memo to all end-users.
- Provide a clear deadline by which the training should be finished.
- Provide addresses and/or telephone numbers, with details on contacting tutors.
- Provide guidelines as how the training could be divided into more manageable parts.
- Actively monitor progress – identify long before the deadline those who might be encountering difficulties.
- Provide short assignments which will serve as milestones for the end-users enabling them to better organise their training.
- Contact those who might be having difficulties to check on their progress.
- Actively support those who are encountering difficulties. Facilitate their lives – remember the aim is for them to do the training and learn.
- Send reminders.
- Increase activity closer to the deadline.

The list is not exhaustive.

As a short summary of this section, when organising an e-learning programme, one needs to think how to keep the human element central to the programme. As with many slogans in many professions, humans make it work!

5.3 *Simplicity*

This counts for many things in life: keep it simple!

It might be even truer in the case of e-learning where the interactions between student and content and between student and the training organisation are made via technology and are inherently more complex than in other learning experiences.

Simplicity is a success factor for an e-learning programme, because the sole aim of the programme is the learning experience. The programme needs to be kept as simple as possible on all dimensions. Its design needs to be simple and its organisation too. The following are some elements which could be kept simple so as to optimise the learning experience:

- Accessibility to the programme
- Navigation within the programme
- Accessibility to the instructor
- Accessibility to a technical helpdesk
- Accessibility to the training organisers
- The possibility of generating comments
- The feedback process

The list is not exhaustive.

6. SUMMARY: IT IS ABOUT LEARNING

E-learning is about learning, it is important to remember that technology is an enabler and not central to an e-learning programme. During the organisation and deployment of an e-learning programme the people in charge need to keep in mind how to enhance the learning experience. This can be done by considering the end-user's motivation to learn, the need for human interaction during the training and by keeping the structure simple.

7. ONE SIZE DOES NOT FIT ALL

Another important aspect that needs to be kept in mind while organising an e-learning programme is that one size does not fit all.

There are two dimensions to this issue; the first is that every e-learning programme needs to fit the environment, context, need and culture of the organisation within which it is being deployed and the second is that e-learning, when appropriate, should be considered as part of the blend [as one ingredient] of training methods that are used to deliver training.

8. E-LEARNING TO BE ADAPTED TO THE ORGANISATION

Once more, like in many other areas, because a particular solution has been successfully used by another organisation it does not mean that it can be automatically used elsewhere with the same success. Of course, learning from others is very important. However, it is the adaptation to the local context, environment and needs which is even more important.

The advice on this point is to plan and organise an e-learning programme according to your organisation's needs and not simply copy what has been used elsewhere without considering these local needs³.

There are a number of things which should be done in order to organise and implement an e-learning programme in the best possible way. These are:

- Have a strategy.
- Think about and formalise the objectives to be achieved by the e-learning programme. This should not only be done in terms of satisfying the training need, but also in terms of other organisational objectives [e.g. gain in time flexibility, cost saving, etc.].
- Consider all the stakeholders in the programme.
- Consider their needs, try to satisfy them and get buy in.
- Get senior management buy-in. Explain to them, if needed, the balance that should be achieved between improving flexibility and efficiency and the learning needs of the end-users.
- Consider how to integrate e-learning with other training methods already in use in your organisation.
- Design a plan.
- If it is the first time that e-learning will be used, start small and phase your deployment into small parts.
- Address the 'fear of change' factor.
- Include human interaction within the training programme.
- Consider the resources needed.
- Consider the technology needed for the programme to run smoothly.
- Keep it simple.
- Consider motivational elements.
- Use examples of good practice when available [but adapt them to the context].

"I need to organise an e-learning programme what should I do?" To answer this question one needs to consider the elements above, ask for advice, get informed about examples of good practice and make sure they fit the organisational context.

³ It should be made clear that this note should not be understood in terms of not copying or sharing content or systems with others. On the other hand, this should be encouraged. What should be avoided is to blindly adopt structures or elements without having considered how they would fit in the local context, just because they have been very successful elsewhere.

9. USING A LEARNING BLEND, WHEN POSSIBLE, TO MAKE LEARNING AS EFFECTIVE AS POSSIBLE, WHILE CONSIDERING EFFICIENCY

In the majority of the cases, even when delivering 'classical' training, a blend of training methods and media are used to create the best learning effect.

In ATC initial training for example, a mix of sessions [including presentations, discussions, CBT, videos, exercises, case studies, etc.], part-task trainers, simulations, familiarisation visits and other methods are used to fulfil the common core objectives. Nobody who has the quality of the end result as a prime objective would argue that any one method should be used by itself to achieve the same results. Similarly, e-learning should be seen as one additional method to be included in an overall training programme at the right dose to produce the best possible blend.

E-learning should not be seen as the solution which will enable the training institution to do away with all the other methods. It should be seen as another ingredient which when used in the right recipes and in the correct doses will improve the meals.

Why is this so?

Firstly because it is important to keep in mind that different people have different learning styles and presenting one method risks excluding some learners because they do not respond well to the learning style presented by the e-learning programme.

Secondly, because each method has its strong and weaker points and a successful blend is one which takes this into consideration and uses a blend of methods which complement each other constructively.

The following table describes the areas where, through research and experience, synchronous CBT could be used or should be avoided:

<i>Should be used</i>	<i>Should be avoided</i>
As preparation to a facilitated session in order to introduce a subject	Very long CBTs with no human interaction
As a follow up to an instructor-led event to provide readily available information	When there is a lot of reading involved (printable documents would be preferred)
As a reference during long courses (the student can log-in and refresh their memory any time / as often as they wish)	To teach a complex skill (with the exceptions of skills relating to the usage of software /computer hardware)
Information retention (i.e. to learn something by heart)	When discussion is the preferred way of learning the subject
To provide demonstrations	Concentration span when a student is sitting alone in front of a computer studying is short max 40 mins including interactivity

Table 1: Asynchronous CBT Strengths and Weaknesses

To overcome some of the difficulties mentioned in the paragraphs above, the design of the overall training is of utmost importance. At the training design phase, the student's backgrounds including their current knowledge on the subject to be presented and their learning styles need to be known, as well as the learning objectives.

This way, the best learning effect can be created. This can be done by keeping in mind:

1. *The situation*

- the learning requirement;
- the target audience;
- practical constraints.

2. *Determining an overall plan to meet the learning need*

- How to meet the learning objectives.
- Deciding on the methods to be used e.g. case study, exercises, facilitation, role-play, tutoring, lesson, simulation, etc.
- Deciding which portions would be distance learning and which would be carried out on site.

3. *Selecting the media:*

- Identify the media tools students have at their disposal [e-learning CBT could be one tool, other tools could be: books, videos, presentation slides, simulators, part-task trainer or other e-learning media such as virtual classrooms, forums, etc.].
- Ensure that the tools are able to be delivered according to your overall plan.
- Keep in mind the constraints.

Ensure that you optimise efficiency without sacrificing effectiveness.

The result of this can be a mix of methods and media rather than a one-size-fits-all solution.

To summarise, a one-size-fits-all-solution should be avoided for two reasons: The first reason is that a solution must always be adapted to the context. The second reason is that a blend of methods and media is generally a better learning solution than the adoption of one method [be it e-learning or anything else].

10. STRATEGY

Perhaps the single most important conclusion of the workshop on organisational issues when using e-learning, organised for training managers at IANS in 2006 was the need to have a strategy.

By strategy we mean all those elements within a plan necessary to allow the organisation to achieve its goals. In this case the goal is assumed to be: deploying a successful e-learning programme which is seamlessly integrated into the overall training programme.

The strategy [or plan, as some would prefer] should be the starting block of the e-learning initiative. The initiative should be seen as a whole and not only in parts. By this it is meant that it is not enough to look at the technical areas or equipment needed or at the content that would be delivered. The organisation of the programme as a whole should also be considered.

The list in the section on 'E-learning to be adapted to the organisation' above can be used as a reference to start building the strategy.

The 2006 workshop identified 15 critical success factors that should be taken into account in any deployment plan:

1. Must be mandated from senior management
2. Must have management buy-in
3. Consideration of the end-users and their needs
4. Sufficient resources must be available [if not, reconsider scope]
5. Sufficient financing must be available [if not, reconsider scope]
6. A clear analysis of what benefits the programme will bring, but also of its constraints
7. The organisation of the programme must be established.
8. A quick win should be incorporated within the overall plan
9. The start should be phased, growing bigger as experience is gathered.
10. Human involvement during the delivery of the e-learning programme
11. Trust
12. Visibility and transparency of results
13. Leadership
14. An appropriate system that is reliable [technology]
15. Quality content

The number one thing one finds in any document giving guidelines on how to do or achieve something is to have a plan. Sometimes, mentioning this might be seen as stating the obvious because it is repeated so often.

However, from experience, there have been many e-learning programme failures because an overall plan was not devised and because those who deployed e-learning concentrated on certain points [the main one mostly being technology] and neglected other important ones, such as having an training schedule during deployment or stakeholder involvement. Taking time to think carefully about strategy will be rewarded during deployment.

The next section deals with one of the most important elements of the plan: stakeholder involvement

11. STAKEHOLDER INVOLVEMENT

Stakeholders are those who have an interest in the activity.

In the case of an e-learning programme there are many within the organisation that have an interest. These range from senior managers to other training personnel including instructors, not to mention the end-users. In some occasions, even people outside the organisation, such as the regulator, might be stakeholders, and therefore must be taken into account when devising the plan.

The table below lists likely stakeholders of an e-learning programme and their likely interests:

Stakeholder	Likely interest⁴	Likely strategies to get buy in
End-users	Learning, relevant, simple, right balance of challenge, support, assurance, encouragement, protection of personal data, remuneration, acknowledgement, etc.	Explanation, involvement, agreement with their union / professional guild representatives, relevant subjects, an effective blend, etc.
Senior management	Efficient training, approved by regulator, flexible work-force, smooth running, etc.	Explanation of benefits, clarity on constraints, clear business case, etc.
Professional guilds	Accuracy of content, respect for the profession, balance between work and training, involvement in composing or validating the training, etc.	Involving them from the outset, get them to validate the material, explain: objectives, structure, protection of data, etc.
Trade unions	Protection of end-user rights, balance on flexibility, remuneration for training, protection of data collected	Explain the goals, senior management commitment on protection of data and just remuneration [time or money], agreement with them before moving forward...
Regulator	Training fulfilling regulatory needs, a clear and transparent process for collecting proof that training has been successfully completed	Collect requirements, explain process, and incorporate feedback and requests from the regulator
Other training personnel [other than instructors]	Clarity regarding where the training fits in with other training in the organisation, what students' involvement will be, the strategy with regard to e-learning	Transparency, involvement at the right level

⁴ Note that the likely interest is indicative only, could be different in local contexts and is by no means exhaustive.

Stakeholder	Likely interest⁵	Likely strategies to get buy in
Instructors	How students will need to interact with the e-learning programme: do they need training? Does it involve different working organisation for them, involvement in developing the training plan, assurance, support, etc?	Plan training with them, involve them, take onboard their suggestions, provide training on usage of new tools, explain, etc.
IT section	Requirements and not solutions, clear responsibilities, budget, resources	Close cooperation, coordinate requests [e.g. resources] with senior management, design responsibilities together, explain business goals
HR	Interaction with other training and development areas for personnel, information, harmonisation with other training activities, etc.	Explain goals, collect ideas and requirements, provide feedback, etc.
CBT developers	Clear requirements, subject- matter feedback, details about the objectives of the training, information about the target audience, etc.	Involve the team, resource effectively, e.g. with subject- matter expertise, include them in feedback loop, etc.

Table 2: Likely stakeholders of an e-learning programme and their likely interests

When planning an e-learning programme, it is important to identify the stakeholders and to analyse their needs. The table above is a list of ten groups that are likely to be stakeholders in an e-learning programme. The local situation could have more or less. Equally, the likely interest of these groups, together with the likely strategies to get buy-in, are only there as an indication, to serve as a starting point for the thinking process of what to do with the stakeholders. For a successful programme, stakeholders' needs must be successfully managed!

Considering operational people in ATM

A vast number of the training programmes, including e-learning programmes in the ATM environment, are aimed at operational staff.

This category of staff, as has been described in the introduction section above, normally work in operations rooms or towers, in front of dedicated CWP's which are not connected to the Internet. They do not normally work office hours either.

When devising e-learning for this category of staff, special caution should be made so as to ensure that a right balance is achieved between increased flexibility and efficiency on one side, and the respect of staff needs on the other.

⁵ Note that the likely interest is indicative only, could be different in local contexts and is by no means exhaustive.

The reason for this special caution is that a good number of the benefits that can be gained by using e-learning are especially attractive for use in relation to operational staff, but these can also be a cause of friction, if the right balance is not achieved.

For classroom sessions, a number of operational staff need to be taken out of their schedule in groups to attend the sessions. This causes higher costs to sustain operations and also logistical costs.

With e-learning, this disruption can be reduced or eliminated because staff can do the training in a flexible manner with no need to remove groups of operational staff at the same time. There is also the added flexibility of scheduling training in off-peak times and perhaps in smaller clusters.

However, since their work place is not connected to the network through which e-learning is normally made available, operational staff need to find an alternative place to do their e-learning. The alternatives are computers at work or at home. If they are scheduled to do the training during established working hours, then they would need adequate computers on which to do them [and the equivalent number required for the number of persons scheduled to do the training at the same time!].

If on the other hand they are expected [explicitly or implicitly, e.g. because not enough computer terminals are available] to do the training from home, then the time scheduled to train on the working premises is no longer useful and another solution to reward staff for time spent training should be found.

The situation above is different for staff working in offices because in general, the problem of availability of terminals does not exist and time issues are normally negotiated on the basis of training being part of the yearly objectives and therefore taken into account in the daily work.

These considerations might sound trivial, but based on experience they have caused a lot of friction in the past with unsuccessful events as a result. These items need to be considered and addressed with the staff involved and a satisfactory agreement needs to be found before the training starts. Some similar cases are discussed in the Resourcing and Budgeting section below.

12. FEEDBACK

Another important general item for a successful training programme is to have a process in place to collect feedback and act on it. E-learning systems often have the luxury of automatically collecting data. However this data turns into information only if it is interpreted by somebody.

Elements such as end-users generally struggling to finish modules, or a high drop-out rate may hide other concerns which could originate in the organisation of the training, its structure or the content. It is up to those responsible to act on the information they receive.

Another issue regarding feedback is that if the right tools are in place, it becomes very simple for the end-users to submit qualitative feedback on what they experience. This feedback should be considered as a valuable basis for improvement.

It is therefore important to remember that both quantitative and qualitative feedback can be collected using e-learning and that this advantage should be used with the aim of constantly improving the programme.

13. FEAR OF CHANGE

At the time of writing, a good number of European ANSPs are in the early stages of introducing e-learning or are in the process of doing so for the first time. Introducing an e-learning programme can bring about considerable changes in the way things are done. If such change is not addressed, complications might occur due to the 'fear of change' factor.

The following table indicates 'fears' stakeholders might have upon the introduction of e-learning:

Stakeholder	'Fear'
End-users	Dependency on IT
	Lack of computer literacy
	Cutbacks in quality of training
	The 'big brother' effect [being over monitored]
Training managers	Lack of control over the technology
	Cutbacks in quality of training
	Cutbacks in training budget
	Failing with the project
	Having a bad start
	Lack of acceptance by end-user
	Ineffective training
	Inadequate budget to run the programme
	Inadequate resources to run the programme
Instructors	Lack of control over the technology
	Reduced personal contact with students
	Being asked to spend time communicating via a computer rather than being in a classroom
	Cutbacks in quality of training
	Cutbacks in training budget
	Lack of acceptance by end-user
	Ineffective training
Senior Management	Failing with the project
	Having a bad start
	Security of the data collected
	Budget and resources needed

Table 3: 'Fears' stakeholders might have upon the introduction of e-learning

Fears produce defence mechanisms. Being aware of the fears has the benefit of trying to avoid them while planning and organising an e-learning programme. All the stakeholders involved, from management to instructors to students could potentially fear a number of aspects about the new programme. Thinking about these fears and how they can be addressed could avoid a number of difficulties once the programme is deployed.

Secondly, being aware about the fears help in the diagnosis of the underlying causes of certain defensive reactions by the stakeholders at any stage of the training programme [i.e. before or after it is organised and deployed].

14. RESOURCING AND BUDGETING

The potential business advantages of using e-learning have been presented time and time again. However, it is worth briefly highlighting these again:

- E-learning costs are mainly related to the development of content and the setting-up of the system:
If the training need is a recurrent one or needs to be delivered to a high number of students, then the break-even point for developing and delivering it through e-learning is earlier than in the classroom equivalent.
- With e-learning there is an increased flexibility in the delivery time. Students could virtually train any time around the clock.
- Students do not need to be taken out of their working environments in big groups and for extended times.
- For training delivered in distance mode, staff do not need to travel to receive training or if on-site training is beneficial for parts of the training [as mentioned in the case for blended learning, above] then the time away from work [and the allowances incurred due to staff being out of their homes] could be reduced.
- There are fewer limitations imposed due to logistical aspects; e.g. size and availability of physical classrooms.
- Etcetera.

However, a balance needs to be struck between obtaining the potential benefits and the other factors which have already been mentioned in this document such as motivation, quality of training, stakeholder buy-in, etc.

15. E-LEARNING INTRODUCES MORE FLEXIBILITY AND IS MORE COST EFFICIENT, BUT DO NOT OVERDO IT

The statement above might seem self-evident and common sense, however, the following short story illustrates that it may not always be the case:

A training organisation used to organise a two-week training course, obligatory for a section of ATM staff, in a centralised location. Students had to travel and spend two consecutive weeks on site.

The training organisation implemented a blended version of this course, which consisted of 30 hours distance e-learning study and one week on site. The gains for the administrations which were sending students to this course were manifold. For example, one week of subsistence allowance and hotel expenses per student instead of two, and the employee would spend only one week outside work instead of two, as the remaining 30 hours could be planned and spread over many weeks.

Told like this, the story seemed to be ideal, however, in reality, the instructors were finding out that many students were finding it difficult to complete the 30 hours of e-learning. One of the main reasons they stated was because their employer would not allow them extra time to do the training! The end result was that for these people, the training value was severely reduced as during the week on site, they had problems in following the course due to the lack of preparation.

This is one example of overdoing the flexibility that e-learning brings, i.e. trying to squeeze in too much! The end results are dissatisfaction and learning objectives that do not work. It is therefore important to keep a balance and to aim for a win-win situation for all stakeholders involved.

The sustainable use of e-learning needs to satisfy business goals, learning and quality objectives and the needs of the end-users. If one of the three groups is unbalanced, the programme faces a severe risk of failure.

16. WHAT TO RESOURCE AND BUDGET FOR?

There are a number of factors that need to be taken into account; here are a selection of them:

- Content development, if needed
- Costs to acquire a delivery system [e.g. LMS]
- Running costs to maintain the system
- Availability of tutors for the programme
- Availability of a technical helpdesk
- Time/budget allocation for staff to follow the training
- Computer terminals availability as applicable
- Time and budget to follow the training from a management viewpoint
- Time and budget to allow the feedback process to function properly
- Monitoring and reporting of programme process
- Initiatives aimed at motivating participants

The budget and resource requirements for each of these items will depend on the local context, however be aware of the first three items as they could hide the bulk of the complexity and of budget and resource requirements. At time of writing, coordinated services to make a common platform and common content freely available for European ANSPs and other EUROCONTROL stakeholders exists at IANS.

For more information contact elearning.services@eurocontrol.int

17. VERIFYING LEARNING THROUGH E-LEARNING

The final section of part 1 is dedicated to how one can verify that the learning has achieved its objectives when the vehicle used was e-learning.

To start with, it is important to make a distinction between summative⁵ and formative assessments.

18. SUMMATIVE ASSESSMENTS

Learning management systems are usually capable of measuring students' progress through a module, the time spent in it, as well as results from an assessment which can be incorporated. The use of on-line assessments may be the logical answer and one of the options.

However, a number of constraints exist with the current mainstream technology available. These constraints are mainly due to the fact that assessments over distance are very vulnerable to cheating, and verification that the actual candidate responded to the questions is very weak. The motivation of having computer-assisted assessments is that it would avoid the need for checks using further resources. However, this is only valid for closed questions, e.g. multiple choice, true/false, yes/no questions. For open questions [even though some software-resolution sellers would claim differently] human intervention is still needed.

Therefore, depending on how serious the assessment is and the nature of the requirements [closed/open questions], delivering via distance e-learning may or may not be an option.

For very serious assessments, in other environments, computer-assisted assessments are still held in secured and designated premises where candidates have to present themselves with an official identity card and once admitted are not allowed to speak to anyone.

For less serious assessments, which could serve as an extra tick, together with for example, the time and progress recordings, closed questions could be incorporated within the modules in the form of exit questions. These questions could then act as gateways to further training, meaning that if the student does not pass, he/she would not be able to proceed with the training. They could also be useful indicators to a tutor on which students were having difficulties.

Average learning-management systems are reliable enough for content to be delivered through them, however not generally enough for secure, high-stake assessments. In order to make the technology as reliable and as secure as possible a lot of investment would need to be made [think of Pareto⁶ 80/20!]. The cost benefit analysis of this might not look that good. Even in less serious assessments, it needs to be kept in mind that most systems will not be 'bug' free, and cases could still exist where items are not recorded correctly on an LMS. To have a bug-free system it would cost a lot of money. [This is one of the reasons why ATC systems cost a lot of money to produce because they need to be reliable over 99.99% of the time]

The alternative is to have assessments summarised on paper. At the time of writing, it is still the suggested option for many features.

⁶ Pareto analysis: <http://www.answers.com/topic/pareto-analysis>

19. FORMATIVE ASSESSMENTS

Formative assessments allow the end-user to learn from the questions asked and to stop and assess whether there is a match between the perception they have of the learning experience and the answers to the assessment exercise.

Because of the nature of asynchronous CBT, having formative assessments embedded within the e-learning programme is very beneficial. These assessments can take different forms, from classical questions but which give feedback depending on the replies provided and pointing to the page, chapter or module where the item was presented, to games, simulations and other original ideas which allow students to assess the knowledge/skill they have learned.

As a conclusion, while it is highly recommended to include formative assessments at regular steps within an e-learning programme it is also recommended to seriously consider the pen and paper alternative when it comes to summarise assessments.

20. SUMMARY OF MAIN POINTS

This marks the end of part 1 of these guidelines about using e-learning. This part focused on organisational issues around the planning and the deployment of this type of training.

The main points of this part were:

It is about learning where the main argument was that in e-learning the main focus needs to be around the 'learning' and not around the 'e'. This section highlighted the importance of motivation, human contact and simplicity within an e-learning programme.

One size does not fit all where the need of adapting the e-learning programme to the organisational environment, context, need and culture and that e-learning should be better seen in the context of blending with other methods and media.

Strategy where the importance of well preparing a deployment strategy as well as having a well thought-out and realistic plan were put forward.

Stakeholder involvement where the likely stakeholders of an e-learning programme and their likely interests were presented together with a special consideration to operational staff needs.

Feedback where the importance of having a feedback process and of best using the data produced by the technological systems was described.

In the fear of change section, the fact that in many places, e-learning would be considered as something new, could produce elements of 'fear' in the stakeholders and that the factors that potentially could lead to this 'fear' needed to be known and managed.

Resourcing and budgeting where it was argued that the correct balance needs to be found between business benefit, the learning objectives and quality, as well as the needs of the end-users. Also, a list of likely areas where resource and budget would be needed was produced.

Finally, in the verifying learning through e-learning section, a difference between summarise and formative assessments was made and guidelines of what could suit e-learning were produced.

This document aimed at giving those interested [training managers, general managers, tutors/instructors] a set of guidelines of what should be kept in mind when investigating the feasibility of implementing an e-learning programme as well as when doing the implementation and deployment. The items produced in this document are the result of research, and experience based on bilateral and multilateral interactions on the subject of e-learning. For more information please contact IANS via info-elearning@eurocontrol.int.

21. APPENDIX 1: DEFINITIONS

Asynchronous communication: Communication where there is a delay between message and response. Examples of asynchronous communication include the post or, in e-learning terms, email, discussion forums/bulletin boards and blogs.

Blog: Short for 'web log'. A blog is a personal online journal which individuals use to record their thoughts and experiences. Blogs can be used within e-learning as a way for students to record and share their learning experiences. Blogs can be accessed on the World Wide Web or through special 'news reader' programs. It is common for readers to leave comments on blogs which the author will usually respond to.

Formative Assessment: A verbal or written factual assessment given for personal development purposes which should have an important and lasting influence on individual abilities or attitudes. Should be applied to the attention or use of one person in particular. Source: EATM glossary of terms.

Module [e-learning]: An individual stand-alone package of a limited duration. An e-learning module can be considered as a building block which used as standalone or together with other modules and other features will make up an e-learning course. Source: IANS e-learning content development process.

Summative Assessment: An assessment which represents a summary of the learner's attitudes and abilities over a period of time. This summation should be given in both a verbal and written form and must be factual in content. It should not be given by those responsible for coaching a particular learner but should be an independent appraisal by suitably qualified personnel. Source: EATM "Air Traffic Controller training at operational units".

Wiki: A web site that can be edited and maintained by its users. The best known example of a wiki is the Wikipedia, an online encyclopaedia which is being constructed by thousands of volunteers.

22. APPENDIX 2: ACRONYMS

ANSP: Air Navigation Service Provider

ATC: Air Traffic Control

ATM: Air Traffic Management

CBT: Computer Based Training

CWP: Controller Working Position

IANS: Institute of Air Navigation Services [EUROCONTROL]

PDF: Portable Document Format

23. APPENDIX 3: REFERENCES

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