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3DEXPERIENCE

COPING WITH THE INCREASING COMPLEXITY OF EMPLOYEE PLANNING IN THE AIR TRAFFIC CONTROL SECTOR

Discover the 'must have' capabilities for best practice ATCO scheduling and optimal cost effectiveness

DASSAULT SYSTEMES

Introduction

Workforce planning in the arena of air traffic control has always been a challenge. Ever-increasing legislation, workforce agreements, fluctuating traffic volumes and a shortage of skilled controllers are all making the task even more fraught.

Spreadsheets and computerized algorithms can help, but usually with severe limitations. Yesterday's scheduling methods no longer meet the demands of a rapidly changing industry. Today, employee planning is viewed less as a tiresome task, more as a strategic tool. In this paper we examine the essential requirements of such an advanced solution for employee planning, from a management perspective.

Companies need to exercise stronger business control in an ever changing world. We discuss the concept of planning systems built around key performance indicators (KPIs) – systems that allow management to balance and fine-tune performance as their business model changes, the aim of which is to get a better grip on organization

Along the way, we examine the factors contributing to complexity, explore the reasons why completely automated solutions can be so limited, and look at a strategy for achieving a workable solution.

The turn of the screw

Yesterday's spreadsheet planning, with all its inefficient iterations and traditional rostering tools, are no longer fit for purpose.

It is worth expanding on the pressures we touched on in our brief introduction – scarcity of trained controllers and increased labor legislation.

CANSO has conducted a number of studies on human resource issues within the air navigation service provider (ANSP) sector and revealed a worldwide shortage of over 3000 controllers. This is in part due to air traffic control officer (ATCO) dissatisfaction with shift patterns and the difficulty in making concessions to employee's preferences. CANSO is working with all its stakeholders on strategies and solutions for these issues.

IFATCA has a well defined work and rest scheme policy and is active in working with ICAO and regulators to ensure that fatigue risk management for air traffic controllers is seen as a safety issue, requiring careful consideration when planning staffing and developing rosters.

The scarcity of trained controllers, coupled with the safety implications and the time criticality of their work, gives national unions and negotiating bodies a substantial say in how the workforce is planned. All the more pressure to accommodate controllers' lifestyle demands.

The implications for workforce planning are becoming clear. Yesterday's spreadsheet planning, with all its inefficient iterations and traditional rostering tools are no longer fit for purpose.

Long-term planning solutions need to encompass knowledge management capabilities, including elements such as business rules, labor regulations and Key Performance Indicators.

New horizons

Truly effective systems have to address three planning horizons - long-term strategic, medium-term tactical and task-based operational.

While some smaller ANSPs may find it possible to accommodate long-term planning using traditional solutions, even they have to seek better ways to address the complex tasks of effective rostering, shift scheduling, event management and dispatching.

At the risk of stating the obvious, it is worth reminding ourselves:

Long-term planning

Long-term planning needs to take into account cyclical factors such as seasonal differences, holiday periods, etc, but also needs to allow for the inclusion of events that might affect flight traffic such as football tournaments, religious festivals, major training exercises and so on.

That's the basics. To become a really effective management tool, long-term planning solutions also need to provide scenario management what -if scenarios. As an example, larger ANSP — with their own training facilities — might want to explore such things as 'what happens if training school pass rates increase?' and 'what would be the effect of changes to retirement age?'.

Long-term planning solutions also need to encompass knowledge management capabilities, including elements such as business rules, labor regulations and KPIs.

Medium-term planning and rostering

Once long-term plans have been established, an integrated system should be able to allocate individuals to specific days and shifts. Some objectives may be mandatory, while others may be more target-driven, such as spreading the number of hours or night shifts worked fairly between the staff.

Many ANSPs adopt a cyclical roster, and these vary substantially between organizations. Some will have one or more weekly, monthly or special cycles. Special cycles may include the type of shifts that can be performed on particular days. Options within such cycles are often limited by the constraints of working with a basic rostering tool.

Typically, once published, rosters need to be amended a number of times to accommodate requests for leave, shift swaps, deep-seated preferences and so on. This is where chaos can set in. Clearly, it is so much more sensible for employee preferences to be taken into account before the roster is published. Better for employee motivation and significantly less reworking for the planners.

Task-based and operational planning

While the roster provides the right number of people on the day, there is still a need to decide in which sectors they will work. In a small ANSP this can often be performed by the supervisor. In a larger organization, or one with complex sectors or employee sector qualifications, the planning system itself should be capable of making allocations. ANSPs may wish to adopt an approach where the system automatically allocates resources for one or more days in advance, or even part of the day. Recognizing the inflexibility of a wholly automated approach, others may prefer a 'decision support' solution, where the system provides all the necessary information to allow the planner to select allocations.

The need is particularly strong where controllers work on several sectors each day, with the added complication of having to accommodate their breaks.

ANSPs also need to re-plan task allocations during the day, in response to such things as flight alterations or weather conditions – real-time disturbance handling. The knock-on effect may require adjustment to the number of ATCOs to match the flow of traffic and the need to reposition controllers in sectors to comply with safety regulations. This becomes further complicated when controllers have only a limited set of licenses for specific sectors.

Any advanced planning solution should be able to support management when evaluating the benefits of one plan over another, while offering the ability to test alignment with overall company objectives.

Raising the stakes: Adopting a truly advanced planning system

There are many similarities between the needs of any two organizations. The devil, however, is in the detail. Each has its own peculiarities and its own way of working. Legislation varies country by country and labor constraints can vary even within a country, location by location.

The two key areas in which ANSPs will always be unique are in the alignment of strategy with performance and the need to accommodate — and continually adjust to — local conditions.

Alignment with strategy: Know what KPIs you are working towards and what makes a good plan

For some organizations, the objective may be to make the best utilization of staff, whereas for others the priority may be to balance workload in order to meet union constraints.

Life being complex, there will usually be more than one objective, each with its own weighting.

What is more, weightings and objectives, in the real world, will change over time. That is why any advanced planning solution should be able to support managers whenever they evaluate the benefits of one plan over another, while offering the ability to test alignment against overall company objectives. It should always be quickly apparent whether a change of plan has delivered both short-term benefits and/or strategic benefits. In practice, there may be check-and-balance KPIs. For example, one set of KPIs for staff utilization (such as percentage hours worked compared to shift hours available and paid for) and balancing KPIs to measure variance in the work assigned to each employee. In such circumstances, dashboard-type displays are invaluable, instantly flagging to an operator whether a change has delivered the best mix of benefits. Dashboards can also highlight the cost of making changes, such as agreeing to a request for leave.

Where there are multiple, possibly competing, objectives these can be weighted and an extra KPI assigned to determine the overall quality of the plan.

Understanding and accommodating staff preferences

With ATCOs being such an expensive and scarce commodity, attracting and retaining staff has to be a priority for any ANSP. The variables are not complex, but the way in which they compete is complex. Accommodating staff preferences in the abstract is not too challenging a task but the variability of real life — employee illness, changes in circumstances affecting the days staff want to take leave and any other schedule disturbances — introduces a whole new level of complexity.

An employee portal can prove to be an invaluable aid, with staff able to update their own preferences and make one-off requests. Employees feel empowered, while administration processes are simplified.

Integration

However effective a planning system may be, we need to recognize that it will have to draw on data from other systems. Examples include employee records, flight volumes or demand data. There will also be times when output from the planning system is used to update other systems. Employees may need to access the system remotely to find out their shift allocation, to express preferences or request swaps with colleagues.

Equally important, integration has to be maintained across the different planning horizons - long term; medium term and rostering; task based and operational.

Easy integration with back office systems, then, is essential. Integration eliminates 'islands of information' and the need for re-keying of data, with all the associated opportunities for introducing errors and inconsistencies.

Levels of planning support

Essentially, there are four possible levels of planning support employed in the industry:

Basic information processing
For many companies, this is the current status: Frustrated planners working with multiple spreadsheets. Planners are not so much making decisions as processing information to keep in touch with reality.

Decision support
Planners make all the decisions while the system processes the data and highlights the implications of planner-made decisions against KPIs indicating the quality of the decision. Provided all rules are incorporated within the system, planners no longer have to validate the plan.

Black box optimization
With this fully automated approach, the system makes all the decisions, using algorithms that are fine-tuned to the company's processes and business rules. Business objectives are managed through KPIs and weightings can be adjusted as the business model changes.

Semi–automatic planning
Optimizers do have their limitations. As mathematical engines, they are unable to interpret rules or apply judgment in the way an experienced planner might do.

With unplanned events, on-the-ground intelligence can often outperform a formulaic solution. Generating new rosters and task plans is all very well, but human intervention can often be necessary in the event of scheduling disruptions. There will always be intelligence known to the planner and not the system – such as extrapolating for sickness cover in the event of influenza over the following few days. The same may be true for interpretation of weather forecasts.

An effective system needs to allow easy intervention, as well as providing a suggested framework for short term changes. Should an employee call in sick, such a system could display a list of possible replacements, together with phone numbers, possibly ranked in order of those most due an opportunity for overtime.

What is achievable, and how?

In summary, an ideal solution should:

- Incorporate all of the standard industry demands
- Be capable of configuring and reconfiguring to meet the unique business mode of each user organization
- Allow management to exercise strong business control, using built-in KPIs that can, in turn, be fine-tuned as the business model changes
- Span long-term, rostering and task-based planning horizons
- Allow planners to see on their planning board the implications of their decisions, as they are made
- Be capable of easy integration with existing IT applications
- Provide 'black box' optimization, with the ability to apply planners' soft knowledge – achieving a better plan

We believe that traditional software approaches, with predefined functions, are no longer capable of providing the levels of agility necessary in a changing environment. Black box optimizers no longer meet the criteria of adapting to change or to KPI-driven management support.

We do have advanced planning and scheduling software which fits the description of an ideal solution – one which we believe offers the benefits of a packaged solution, developed to meet the needs of the ANSP sector, yet capable of being configured to the organizational and the operational specifics of any one ANSP. Equally important, it is capable of accommodating change whenever working practices or operational procedures change.

Find out more

If you would like to receive more information on the DELMIA Quintiq solution and learn how it can benefit your organization, please contact us or visit **our website**.

DFS improves ATCO scheduling with integrated DELMIA Quintiq solution

Around the world, large ANSPs work in dynamic, complex environments. They need scheduling systems that can change and grow with the company, and they need round-the-clock support for their system's administration.

Germany's Deutsche Flugsicherungs GmbH (DFS) was scheduling its ATCOs using a standard commercial shift scheduling system. In 2005, when the system's developer stopped all software development and declared that it would no longer provide support or upgrades, ANSPs worldwide were left in a lurch.

DFS is one company that wasted little time in deciding to replace the legacy system, seeing this as an opportunity to improve its scheduling and planning capabilities. DFS had high expectations for the new shift scheduling software as it wanted a solution that could exactly meet its specific planning needs. An additional requirement for the new system was that it be able to integrate with DFS's IT environment.

Answering these criteria, the DELMIA Quintiq solution was chosen to replace the former system. It was first implemented in the Bremen Control Centre and, over time, expanded to all of DFS's control centers and towers.

The Bremen Control Centre is one of DFS's five national control centers and 16 towers. Of the 1,800 ATCOs working at DFS, 270 work in Bremen together with 50 flight data assistants, helping to direct more than three million flights that cross the German skies annually. For many reasons, planning and scheduling this large number of employees is an extremely complicated task.

First, government regulations regarding the number of controllers and the licensing necessary to man each sector are very strict. Second, DFS has to deal with a complicated set of collective labor agreements which can vary from site to site. Finally, Europe has suffered from a shortage of ATCOs. Short-term scheduling and long-term recruitment and training must take this into consideration.

DFS's future vision is to benefit from the DELMIA Quintiq solution even further. Using some of the most advanced planning algorithms available today, the DELMIA Quintiq solution is able to exactly adjust the number of ATCOs to the flow of traffic and to position controllers in the right sectors to constantly ensure that safety regulations are strictly adhered to.

The solution is also flexible enough to include different labor agreements for each control center and to take into consideration employee preferences.

Improved personnel utilization and employee rostering according to shift preferences reduces stress in the workplace and improves employee motivation and satisfaction. Moreover, DELMIA Quintiq helps DFS in better dealing with staffing deficits.

Another reason DFS chose DELMIA Quintiq was because of the unique capabilities which allow the system to be configured to meet DFS's strict planning requirements. DELMIA Quintiq and DFS have been working closely to develop the DFS-specific aspects of the system. As with IT system upgrades in any large organization, the implementation process at DFS had been complex. Understanding that this is normal, DELMIA Quintiq solutions are extremely flexible and the implementation process is iterative, with quick turn-around times for updated versions.

The DFS rollout eventually included all of DFS's ATCOs and operational technical people in the control centers, tower sites and Aeronautical Information Service Centers - a total of 2,700 people. Also, additional functionality including productivity checks, event handling in real time and controller training alerts was included in the system at a future date. Together DFS and DELMIA Quintiq will continue to bring ATCO scheduling to new heights.

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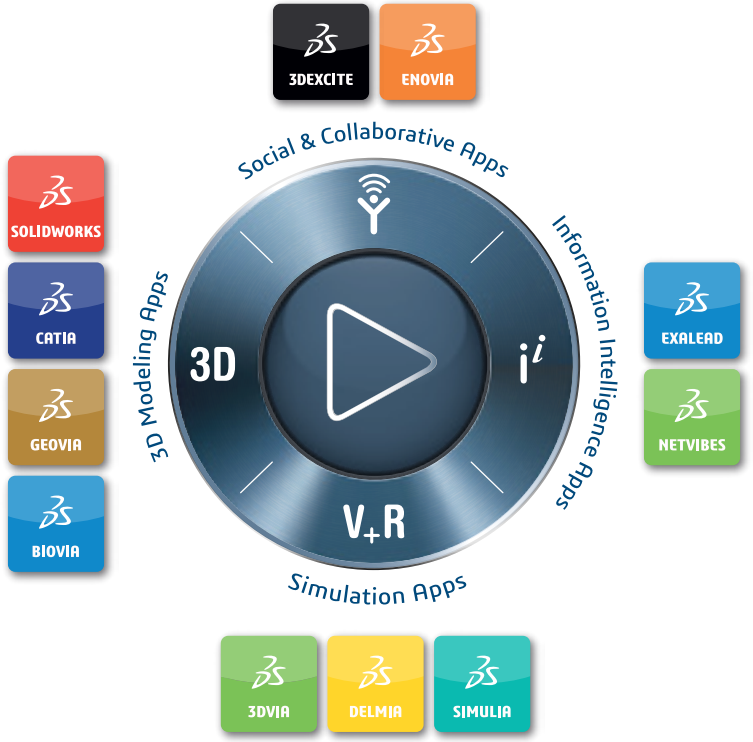

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