



DSNA

direction générale
de l'Aviation civile

direction des services
de la Navigation
aérienne

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Présenté par
Raïlane Benhacène

Tackling the problem of Flight Integration

Barcelona, ATM 2007, july 2-4



Liberté • Égalité • Fraternité

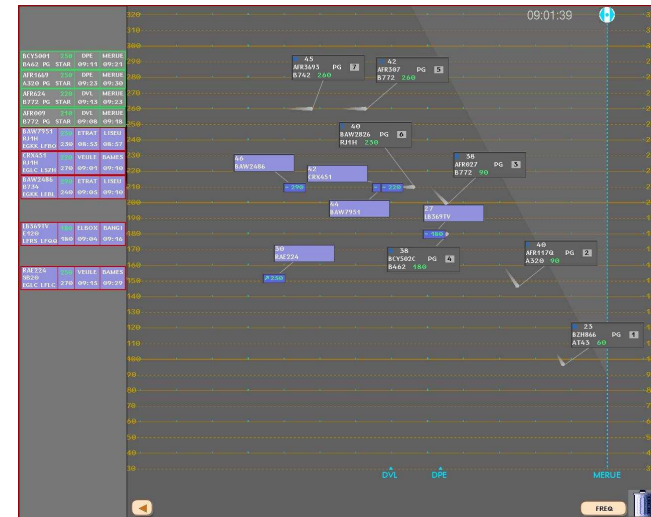
RÉPUBLIQUE FRANÇAISE

ministère de l'Écologie
du Développement
et de l'Aménagement
durables

Presentation Outline

- **Introduction (How we got there)**
- Why we did this (Now tell me what's missing ?)
- Understanding Flight Integration
- How did we get out of it (the iterative process)
- Discussion
- Conclusions

Introduction



- An existing tool for air traffic control in Terminal Sectors (ASTER)
- Experiments proved the workability of the tool
 - Input is satisfactory
 - Vertical View is fine
 - Ball train is adequate to represent an A-MAN
- And yet an persistent feeling that...
 - ...something's missing.

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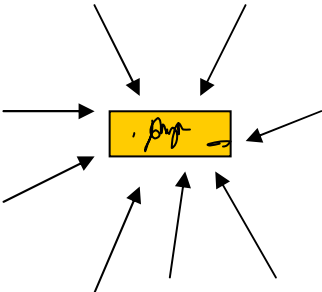
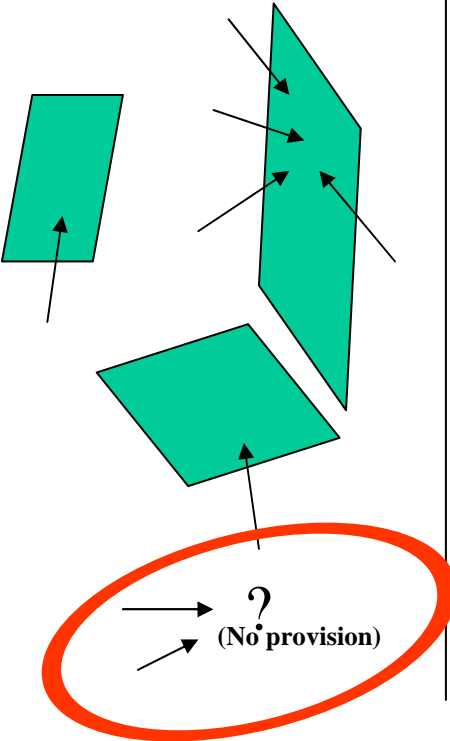
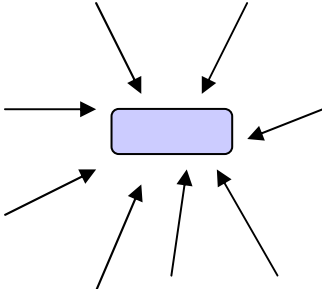
Flight integration – what is it?

- Analyse key elements about the flight before it enters the sector
- Detect unusual aspects of the flight
- Compare with existing traffic inside the sector
- Anticipating « interference » with other flights
- Build a first mental image of the flight, and a first plan of action thereupon
- Make decisions and implementing them

*Throughout this process : Share this analysis with the teammate
In other words : mark the strip or else let the teammate know about
whatever work has been done. TASKS are NOT fixed*

DSNA

The paper Strip, the information it bears, and how to use it...

<i>Functions of the strip</i>	Paper Strip	Stripless	Electronic Strip
<ul style="list-style-type: none"> • Capture Clearances • Memory Aid • Traffic organizing • Task Scheduling • Highlight Alarms or Conflicts • Analyse Route an entry FI.Level • Implicit Coordination with teammate • Explicit Coordination with teammate • Etc. 			

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Flight integration – how & what?

- Why ?

No matter how costly, ANTICIPATING will save your day

- How ? 2 controllers involved

Share a common view on traffic and build a plan therefrom

- What ?

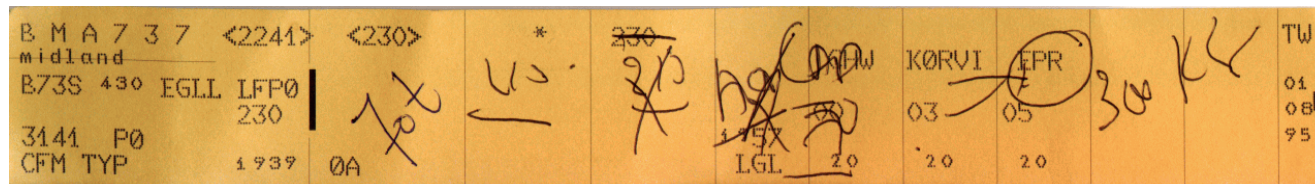
A flexible, COOPERATIVE TASK, if anything

Flight integration – Major Issues :

1. Maintaining a correspondance list is Mentally Costly

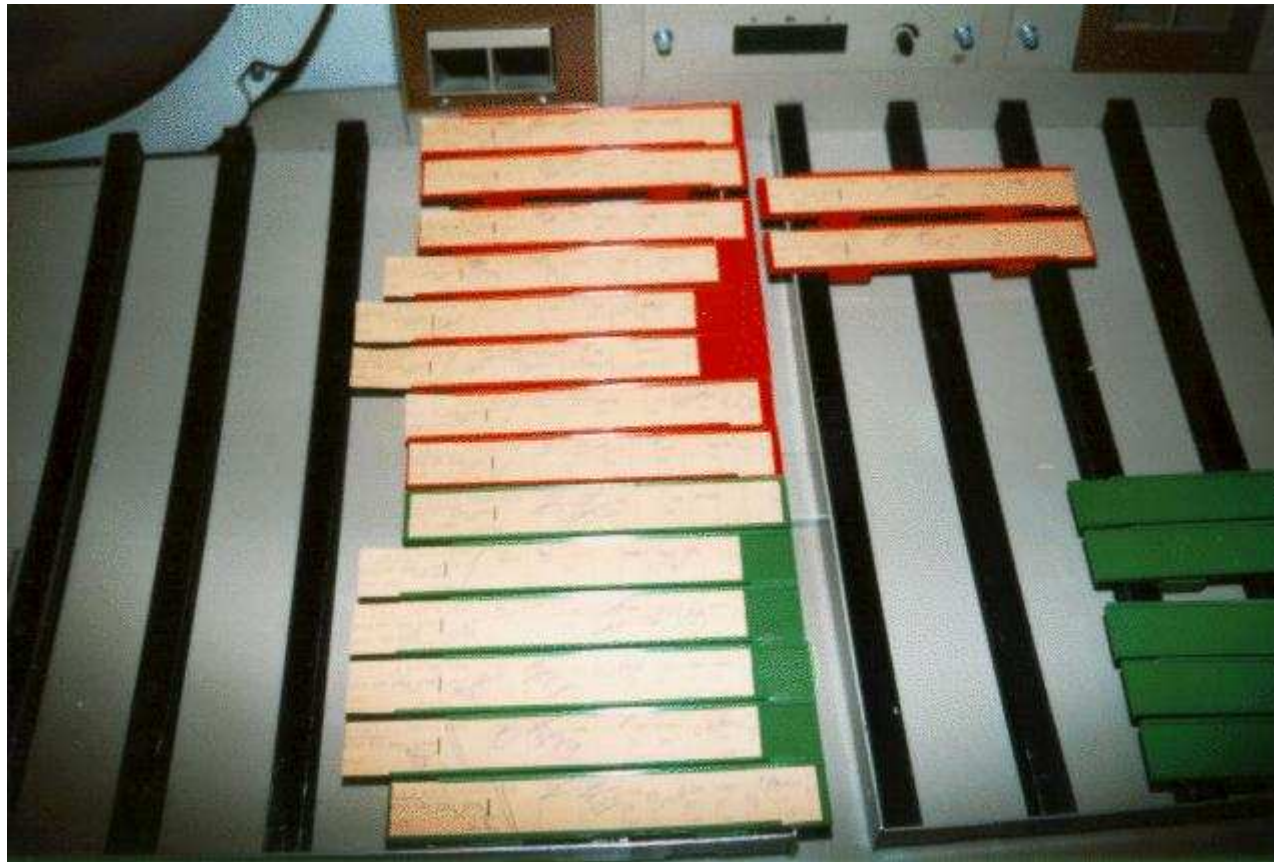


2. Shared artefact « embodying » flexible workshare



Flight integration – how & what?

It's not that the data's missing, it's the way we use it...



13:08:38

44
CRX401N

← 0

0 46
AZA322 PG ②
A321 230

41
BCY5041 PG ④
B462 240

35
AF715BR PG ⑤
A320 240

32
GNF312 PG ⑥
D328 240

25
FGJBS PB ①
BE20 180

21
LXFRZ PB
BE9L 160

CRX401N	0	0	ELBAK	GELTA
B31H 310				
EIDU 15ZH			13:24	13:24
TUAF022	210	210	ELBAK	GELTA
C180 170				
LFRJ LFSC			13:17	13:19
LXFRZ	160	0	TRO	OMAKO
BE9L				
LXFRZ PB			13:29	13:38
LSGG LFPB				
CRX596	160	0	ERTIP	OMAKO
SB2K				
LSZB LFPG			13:24	13:35
FGJBS	180	20	ERTIP	OMAKO
BE20				
LSZB LFPB			13:18	13:30
GNF312	240	30	ERTIP	OMAKO
D328				
LIME LFPG			13:16	13:26
AF715BR	240	30	TRO	OMAKO
A320				
LFMN LFPG			13:17	13:23
BCY5041	240	40	ERTIP	OMAKO
B462				
LIRQ LFPG			13:10	13:19
AZA322	230	30	ERTIP	OMAKO
A321				
LIRF LFPG			13:07	13:15
AF645PG	240	40	TRO	OMAKO
B735				
LFLL LFPG			13:09	13:15
AFR823	240	30	TRO	OMAKO
A343				
F00L LFPG			13:06	13:11
AFR456R	200	30	ERTIP	OMAKO
A321				
LIRF LFPG			12:58	13:07

OMAKO

TRO

DJL

30

Abs|Rel



-40

-30

-20

-15

-10

CAP

+10

+15

+20

+30

+40



TINIL

ERTIP

NANOP

IPLAN

INKAK

OMAKO



Star

Stack

Asas

D/L

PAD



RA
125.825



Undo
CLR



W

Billes

Adagio



AF715BF Air France A321 DJ LF
AAF1156 Air France A321 DJ LF
CRX636 Air France A321 TINIL LFPG

FGJBS Air France A321 RL LF
BCY5041 Air France A321 TINIL LFPG

LXFRZ BE9L LSGG LFPG 160 110 160 (160)
KASON TRO INKAK OMAKO PBOMA
13 13 13 13 13
15 29 33 38 56

AFR823 AIR FRANCE A343 FOOL LFPG 240
DJI_5W

AF645PQ AIR FRANCE B735 LFL LFPG 240
DJI_5W

AZA322 ALITALIA A321 LIRF LFPG 230
TINIL_5W

AFR4588 AIR FRANCE A321 LIRF LFPG 200
TINIL_5W

GNF312 GANDALF D328 LIME LFPG 240 110 260 (260)
TINIL ERTIP NANOP IPLAN INKAK OMAKO
13 13 13 13 13
05 16 18 20 22 26

OMAKO

TRO



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Iterations - involving the users

- **Low fidelity Mock-ups**
- **Short cycles from (wish) to (hands-on trial) : less than a month**
- **4 cycles : converging rapidly**
- **Understanding the needs accurately**
- **Same users from start : team building a mutual understanding, trust and saving «training» time**

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Flight Integration : a PC-EC work share and a common view

- **Situated cognition :**

Strip = Artefact for mental image synchronizing.

I see what you do,

I see what you mean,

I guess what you think, etc...

Cognition creeps over the workplace, the tools and strips

- **Representation : possibly the best « Decision Aid »**

- **Manual Board Organisation – A powerful common workplace**

Synchronizing PC and EC Electronic Boards – An option or a Feature?

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