



---

*User Request Evaluation Tool (URET)  
Adoption and Adaptation,*

*Three Center Case Study*

Tatjana Bolic, Mark Hansen

ATM 2005, Baltimore

June 29, 2005



## *Problem Statement and Goal*

- ❑ The objective of this paper is to present findings of exploratory interviews regarding the air traffic controllers' adoption and adaptation of User Request Evaluation Tool (URET). The importance of this investigation lies in better understanding of changes brought about by the use of Decision Support Tools by sector controller teams and what can be done to avoid some of the unintended consequences.
- ❑ The goal of this research is to draw lessons from the experience with URET that can inform technology deployments in the future



# *Introduction*

- Human operator limitations - improvements in form of Decision Support Tools (DSTs)
- Incremental development, of Air Traffic Control (ATC) system in USA
- “Early and continuous testing of human factors issues is essential for a successful DST design” (Cardosi)
- AAS, STARS - CTAS
- Good design not always enough
- System integration
- Need to know more about adoption of automation in ATC – to facilitate easier and faster transitions from one system to another

A C D G P W Recenter

TR5175 T/DC9/A

S... Exit

1953:13:50

Gr

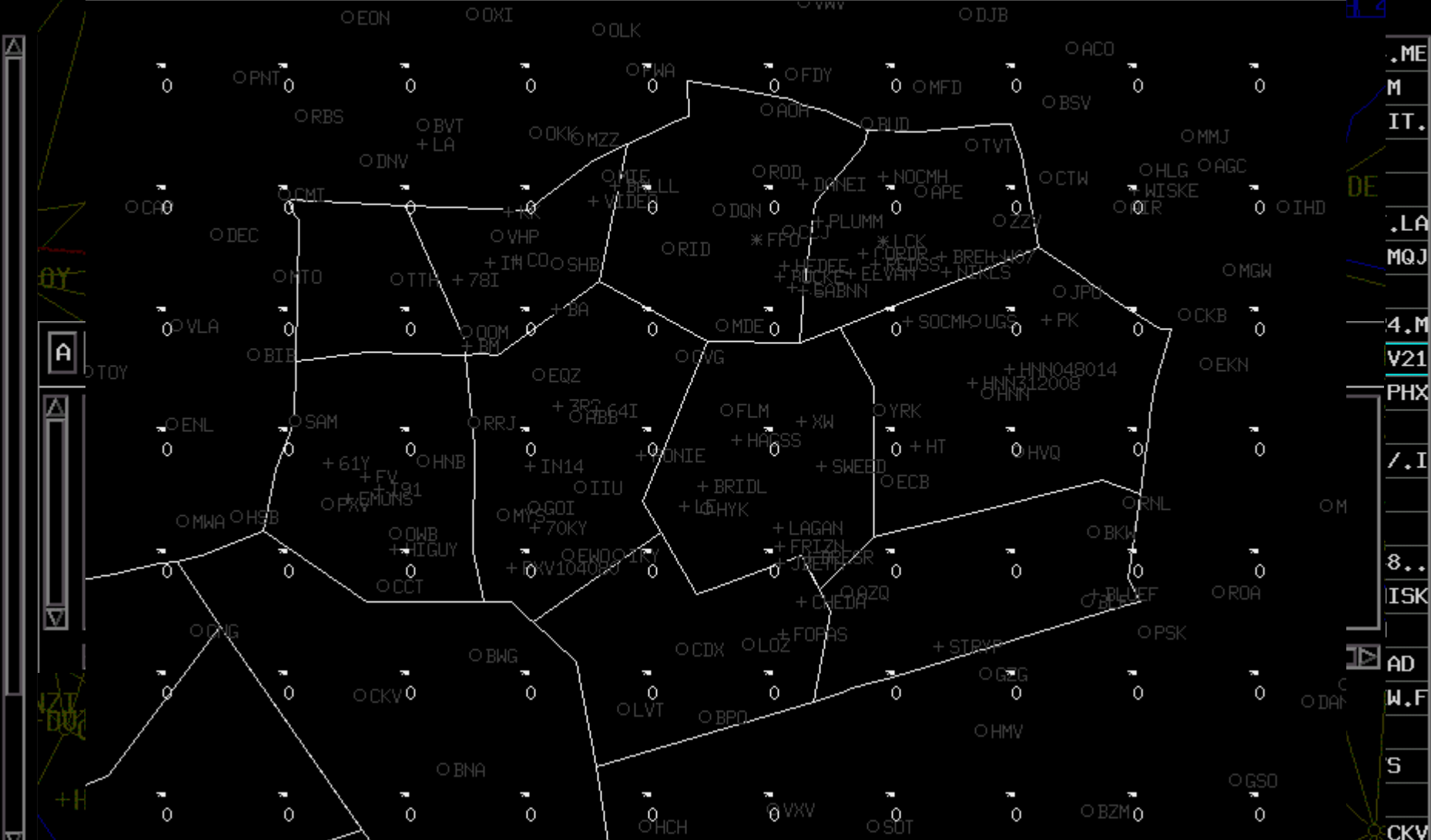
A C D G P W Altitude... Recenter Zoom In Zoom Out Show Temp Exit

Alt: 30,000 Ft

Date: 01/01/1995 Time: 00:00



317  
003  
1.4



- .ME
- M
- IT.
- DE
- .LA
- MQJ
- 4.M
- V21
- PHX
- /.I
- 8..
- ISK
- AD
- W.F
- S
- CKV

Flight Data Previous Route

Exit

MEI 4



---

## *URET Description*

- ❑ Usage variation:
  - ❑ Different teams use it in a different way
  - ❑ Usage differs from the intended usage
  - ❑ Usage differs across centers



## *URET Diffusion*

- ❑ **Diffusion of innovation:** “is the process by which an innovation is communicated through certain channels over time among the members of a social system “
  
- ❑ 4 elements:
  - ❑ Innovation - URET
  - ❑ Communication channels – inter personal and inter facility FAA networks
  - ❑ Time – length of URET usage
  - ❑ Social system – individual en-route facilities



## *URET Diffusion*

- Social system norms
- Innovation characteristics:
  - Relative advantage
  - Compatibility
  - Complexity
  - Trialability
  - Observability
- Adaptation: “the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation “



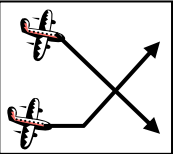
## *URET Usage*


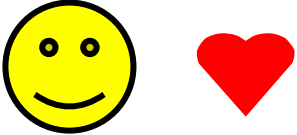


- ❑ URET in operation in 10 centers
  
- ❑ Three “waves” of deployment:
  - ❑ Indianapolis, Memphis
  - ❑ Kansas City, Chicago, Cleveland, Washington
  - ❑ Jacksonville, Denver, Minneapolis, Forth Worth
  
- ❑ Exploratory interviews in one center of each group





# Center 1

Airspace	Traffic	Staffing	Culture	Time	Training
	Fairly busy	Enough for having teams	Team oriented	9 years	70 hours Mostly HCI

Strip Replacement	Route Amendment	Trial Plan	Conflict Probe
			



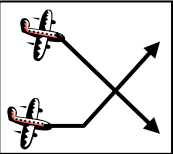
# Center 2





Airspace	Traffic	Staffing	Culture	Time	Training
	Moderate	Enough for having teams	Individualistic	1.5 years	36 hours some examples

Strip Replacement	Route Amendment	Trial Plan	Conflict Probe



# Center 3

Airspace	Traffic	Staffing	Culture	Time	Training
	Very busy	Not enough for having teams	Individualistic (tracker)	2 years	36 hours some examples

Strip Replacement	Route Amendment	Trial Plan	Conflict Probe
			



## *Conclusions*

- ❑ Qualitative evidence that each center can be considered as a separate social system
- ❑ Social system norms or “Center Culture” can greatly explain center-wide variations
- ❑ Team differences and unintended usage of URET results from automation characteristics and re-invention
- ❑ Future work - Survey development and administration



## *Conclusions*

- ❑ **Fast adoption** of functionalities for which advantage of use is perceived – electronic flight strip replacement
  
- ❑ **Slow adoption** when adopters need to change their set of values in order to use to use the innovation – full use of URET functionality implies “strategic” control contrasted to current “tactical”



## *Conclusions*

- Re-invention causes:**
  - Loose-bundling which allows for separate function use
  - Lack of full knowledge – insufficient training and/or insufficient length of use
  - Lack of situations for which the tool is designed (strategic support for the D-side controller)



# *Recommendations*

- ❑ With the separate development of different DSTs and their pending integration into one system, it is important to know how each of them is being used, to be able to formulate a successful program for the effective integration
  
- ❑ Studies of automation adoption and adaptation of different DSTs should be a prerogative
  
- ❑ Future work:
  - ❑ A survey designed to assess URET adoption
  - ❑ It will help us identify the most promising strategies for increasing automation adoption rate and for encouraging “positive” adaptation