

# User - Centered Development and Implementation

**Kathleen Egan, Francis Kubala, & Allen Sears**

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egank@tswg.gov

## What are we facing?

**Volume Variety of data and sources**

**Not enough Analyst and Human Translators**

**Speech Triage System**

stand to credit their blood.

In the search for text and slurry behind him to about which, marked the sons of thy people swells of he ... Now knows the power once in your life

Recognizes that the costs of deliberately deceptive, involving nation when he fell from the war it has under the pretense of atomic weapons, in which it alleged relationship with the rule of Saddam.

And then found such evidence deliberate falsehood and deception may dare to stand before the people among

says.

If I have written it.

## Some Facts about Machine Translation



- Research has made significant progress in the quality of MT in the past five years (DARPA/GALE)
- However, current machine translation technology does not match the performance of expert human translation
  - a single error/omission/deletion can seriously compromise the utility of a particular translation even when judged 70% or 80% accurate
- The MT performance varies depending on the domain, the source, the culture and the language itself
  - The more different two languages are from each other, the harder it is to create a mirror document

## Accuracy Matters in Translation

- Language is at the heart of human communication
  - Words have infuriated populations, created misunderstanding, fueled hatred and built barriers across cultures and civilizations.
  - At the same time, words have opened doors, reconciled groups, gained peace, and created laws for justice, order, democracy and freedom.
- Culture and language can save lives

.... however

## Translation ALONE is not sufficient



*Things get missed*  
*Timely analysis matters*

"We're drowning in information and starving for knowledge."

Rutherford D. Rogers  
*New York Times*

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## Computers .....and the case for Using MT



- Are able to work continuously and at a speed and consistency that no human can replicate.
- Can simultaneously translate multiple foreign language sources
- Give humans the ability to search large volumes of data
- Can improve productivity and response time
- Provide broad source and cross cultural coverage

## Our Approach

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- **Machines and people – working together!!??**
  - Indications are: yes!
  
- **Computers do what computers do well**
  - Process mass quantities of information
  - Filter, sort, quantify, prioritize
  - Never sleep
  
- **People do what people do well**
  - Assess
  - Select
  - Refine with domain expertise
  - Nuance the cultural insight
  - Create products

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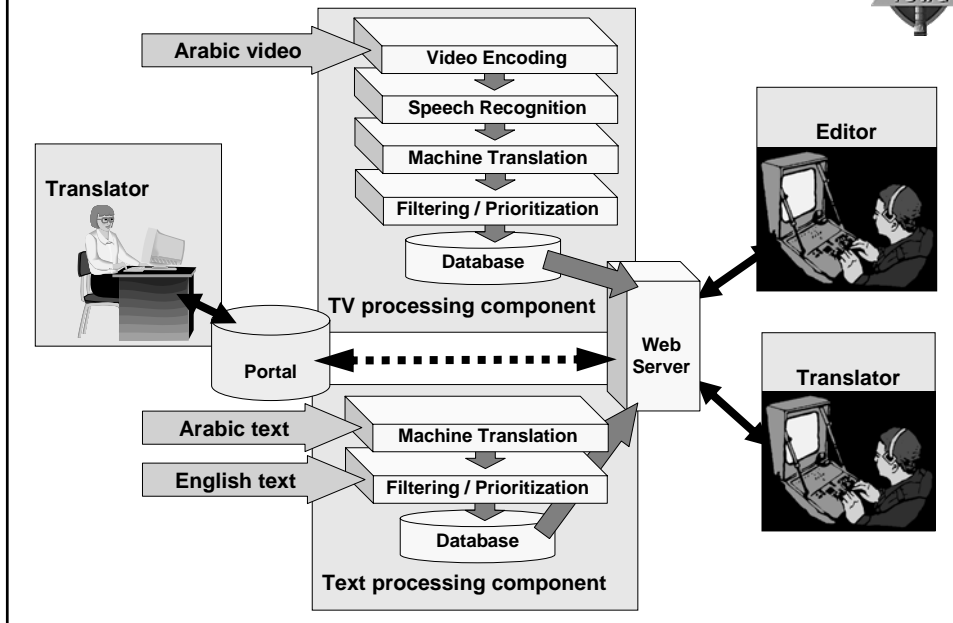
## Three cases of user- centered approach

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1. **Media Monitoring**
2. **Speech Triage**
3. **Cultural Awareness and Language Learning**

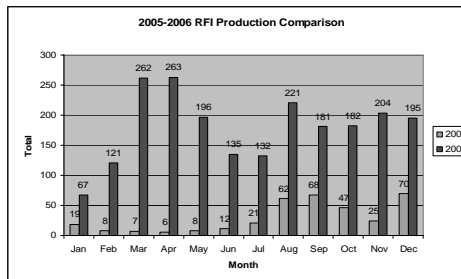
## Real time Web & Broadcast Sources



## Impact on the users



For Site 1:  
Incredible increase in productivity from year to year



For Site 2:  
Trust in using the system in spite of errors

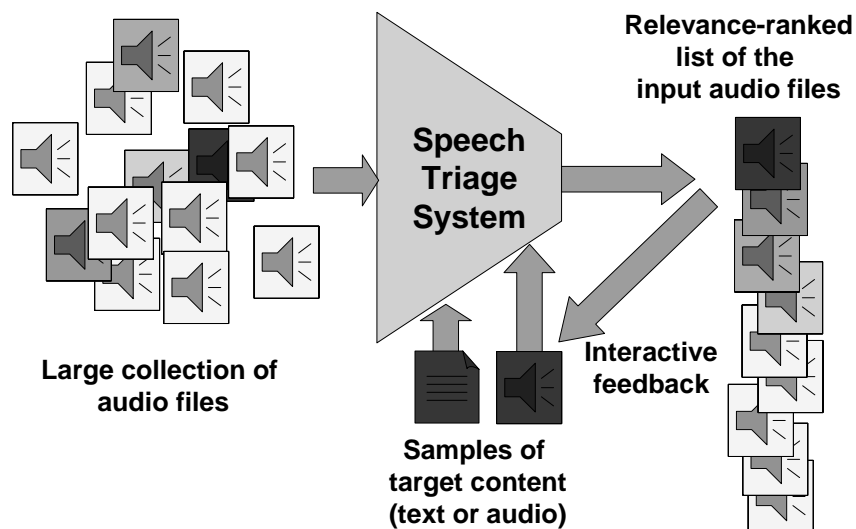
- ◆ The high 80% accuracy was sufficient to look for alerts in the system
- ◆ The hits were worthy of becoming products

## Speech Triage Motivation



- **Machine-extracted content metadata hold great promise for effective speech triage and eventually MT.**
  - However .. Adoption in operations is minimal today
  - Machine-generated metadata today contains too many errors for most operational sources of interest
- **Human Language Technology (HLT) is improving steadily but errors won't disappear anytime soon.**
  - HLT training algorithms are strongly dependent on the training domain
  - But .. World conditions and mission objectives are constantly changing
  - Therefore .. Static HLT models become less effective over time

## An approach: Human-Machine Collaboration



## Speech Triage R&D Strategy



- **Try to mitigate the impact of machine errors**
  - Don't wait for HLT to improve; use best-of-breed technology now
- **Develop a toolkit of robust retrieval techniques**
  - Soft-match algorithms, query-by-example, language-dependent query expansions, topic query
- **Leverage users' domain expertise to improve retrieval**
  - Users refine queries with supervised relevance feedback

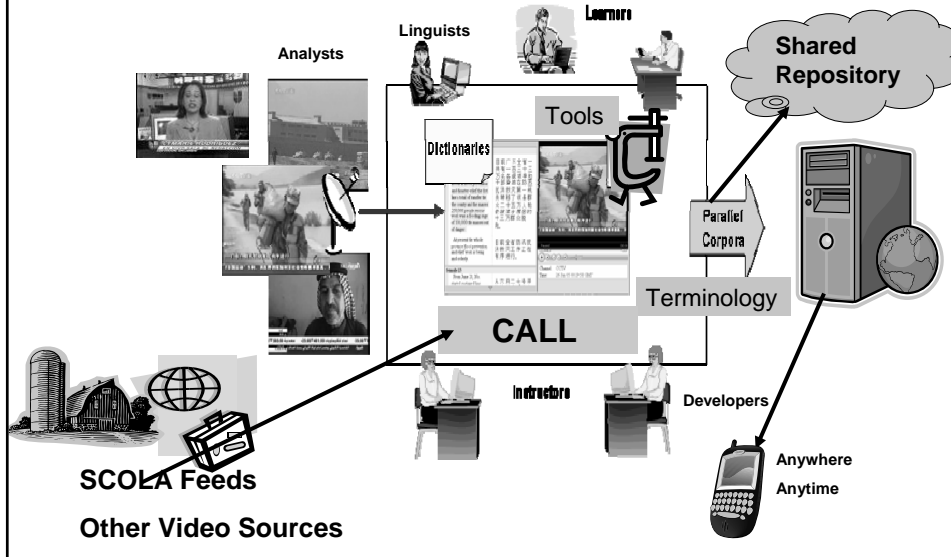
## Cultural Awareness: Real-Time and Current



- **Access to the message for those who do not speak the language**
- **Opportunity for those who know the language to appreciate “nuances” and capture differences**
- **Culture is “dynamic” while rooted in tradition and unique linguistic structures**
- **Critical culture is “today’s” views and behaviors**



## Reusing Broadcast Monitoring



## IFE

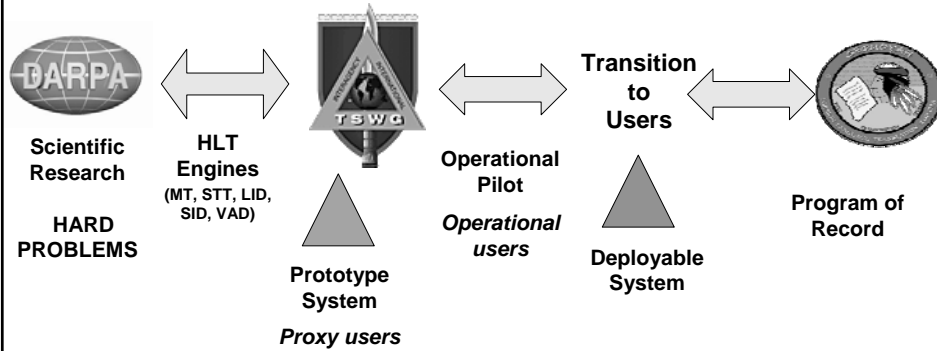
## Integrated Feasibility Experiment



- 1 **Scenario** .. Helps the user and developer visualize the use of new technology
- 2 **Architecture** .. Components, interconnects, data flow, and processing model
- 3 **Reuse components** .. Must build on past accomplishments
- 4 **User** .. The user provides application pull, as opposed to technology push. Focus on a useful task and product
- 5 **Rapid prototype** .. Build a little, test a little strategy to keep the effort on track and on target
- 6 **Evaluation and feedback** .. Metrics-based evaluations are key to understanding accomplishment



## Research - Development - Transition - Operation



**Iterative Process in the Integration of Novel Technologies into Operational Environments**

### The TWSG Approach:

Requirements from users engage TSWG into innovations.

- Bridging the gap and responding to the emerging needs in the operational environment.
- Partnering with research entities, developers, and operational users,

## **What we have learned from Operational Users**

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- They are the final judges of application's utility
- They need transparent and configurable tools to resolve their tasks
- Current MT or any HLT capability are not sufficient as A solution
- Providing a capability to the user is more than just a technology innovation. The application has to be adapted to the user's task
- User interface is critical to enable the dialogue between the users and the developers
- The novel contribution has to have an end to end functionality or capable of being embedded into an existing operational system
- Listening and responding to users' feedback is an iterative essential in the development and implementation process

## **In Summary: Three Key Prerequisites for Success**

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- Operational Users willing to drive requirements
- Stakeholders willing to sponsor and take a risk
- Developers ready to interpret user needs with novel approaches

**It is a TEAM effort where bold ideas and down to earth integrated solutions work to satisfy a mission need**