LANGUAGE TRANSLATION SYSTEMS

DEMONSTRATION AND ASSESSMENT REPORT

LIMITED USER EVALUATION
YAMA SAKURA 45
21-30 JANUARY 2004

This document describes the Language Translation Systems limited user evaluation conducted at during Exercise Yama Sakura 45 from 21-30 January 2004. It reflects our observations, conclusions, and recommendations. It does not necessarily represent the formal position of the Marine Corps or the Department of Navy.

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1.0 BACKGROUND

The Language and Speech Exploitation Resources (LASER) Advanced Concept Technology Demonstration (ACTD) is a five-year (FY02-06) program to identify, integrate, test, evaluate, demonstrate and assess the military utility of language technologies for text-to-text translation, speech-to-speech translation, optical character recognition, training tools and cross-lingual information retrieval. (data mining and management)

A primary LASER ACTD program objective is to provide and assess leading-edge technologies and concepts to reduce the language barriers experienced by operations and intelligence personnel. The LASER thrust is to improve interoperability, accuracy, and timeliness of translation for speech and documentation. Both Operations and Intelligence communities require speech and text processing capabilities in a wide range of foreign languages to support coalition/joint task force headquarters and field operations. Language related technology is a fundamental enabler in collection, processing, and exploitation of foreign language materials and sources.

The U. S. Marine Corps Forces Pacific (MFP) Experimentation Center (MEC) serves as a focal point for MFP transformation and experimentation throughout the Pacific and Central theaters. The MEC is co-Operational Manager (OM) of the LASER ACTD and as such seeks to employ and evaluate the LASER language technology tools in controlled and uncontrolled environments and joint/combined exercises within the USPACOM. Use of these in exercises will provide realistic estimates of the usefulness of state-of-the-art tools under operational conditions. In-garrison use of the tools on a routine basis will permit users to become more familiar with the technology prior to LASER military utility assessments (MUAs), assist them in bridging the language barriers encountered in the course of their daily duties, and will afford a mechanism for users to provide regular feedback to the LASER ACTD Operational Managers.

2.0 PROBLEM STATEMENT/OPERATIONAL NEED.

The United States (US) Combatant Commands, Intelligence Community (IC), and Coalition partner nations conduct worldwide operations with widely diverse languages, often with insufficient numbers of language qualified analysts and translators to support existing mission requirements. Communications with our coalition partners and the local population is usually a primary issue.

On the operational side, our ability to coordinate with partner countries and the local government is often hampered by language difficulties that are made more difficult by military jargon.

The US Military also finds itself more and more in coalition task forces and exercises. Major issues include the high volume of material to be analyzed and the diversity of languages encountered, necessitating the need for greater efficiency and speed in analysis and the limited numbers of language professionals.

Similarly, in the intelligence-gathering function where trained linguists do exist, we face operations routinely with insufficient numbers of language qualified analysts and/or translators to support mission requirements. In this area of intelligence support, major issues include the high volume of material to be analyzed, the diversity of languages encountered, the need for greater efficiency, the speed in analysis and the limited number of language professionals.

3.0 GOALS AND OBJECTIVES FOR YAMA SAKURA YS45 LT LIMITED USER EVALUATION (LUE)

The primary goal of YS45 was to demonstrate and evaluate technologies and their concepts in an effort to reduce language barriers experienced by operations and intelligence personnel. The over-arching thrust being to improve interoperability, accuracy and timeliness of translation for speech. Specific demonstration objectives include the following:

- Reduce the foreign language barriers across the full spectrum of transnational and coalition operational areas including personnel administration, medical, legal, political, intelligence, operations, logistics, plans, and C4I
- Extend and improve language translations technologies to accommodate the jargon and lexicon of military endeavors (military speak)
- Expedite the planning, coordination, and execution of military operations by coalition forces down to the service component headquarters of each country
- Expedite access to foreign sources and accelerate processing of foreign language material
- Integrate language translation and other language processing tools into Intelligence Community (IC) activities, the full spectrum of coalition military activities, including planning, operations, logistics, C4I, evidence gathering and processing, and tactical/strategic warfare efforts
- Develop and demonstrate tools to improve foreign language learning and sustainment of language skills

The above objectives form the basis for the assessment/evaluation criteria.

4.0 THE LANGUAGE TRANSLATION TECHNOLOGIES

4.1 Speech-to-Speech Translation Aids [Speaking Minds(S-MINDS)]:

S-MINDS, Speaking **M**ultilingual **I**nteractive **N**atural **D**ialogue **S**ystem, is a two-way speech-to-speech translation system intended to aid in the process of interviewing people in the field in a second language. When an interviewer speaks his question, the system recognizes what was said and displays the text on the systems screen, as well as displaying the translation, which also is being played aloud to the interviewee. The interviewee can then speak his answer and speech-to-speech translation, from the second language back to the first, will occur in the same way.

S-MINDS is organized in a question-answer style, with all questions and answer samples grouped into domains and topics. Default installation is on a Sony Picturebook, allowing for a high degree of portability. It also comes with a hands-free microphone. The interviewer and interviewee can take turns in speaking into this microphone.

Key Features

- **Interaction Logging Module** This logging module allows the user to record all interviews, so that both sides of a conversation be replayed at a later time and place.
- **Portable** SpeakingMinds is implemented on a very light handheld notebook and thus be can used at any location and at any time. The system also comes with a noise-cancellation, hands-free microphone that is positioned in front of the users.
- **Flexible** The system can be installed on any computer with Windows NT or 2000.
- **Speaker-independent** A speaker-independent speech recognition engine does not require any training.
- **Intuitive Graphical User Interface** This interface minimizes the amount of training required to use the software.

Evaluation of speech-to-speech aids will focus on device durability and ease of use, understandability by the target individual (translations and vocalization, where applicable), sufficiency of the pre-programmed information, and cultural and other human response issues. S-Minds will be utilized in the following areas:

- Interrogation of enemy prisoners and other potential hostiles
- Interview of friendly parties and neutral non-combatants for humanitarian and peacekeeping purposes
- Coordination of civil-military operations

4.2 Forward Area Language Converter (FALCON/ SYSTRAN 4.2 web service):

Note: In place of FALCON per se, SYSTRAN's USG server, version 4.2, was deployed in a web server configuration at YS45 as a functional equivalent for the Japanese/English engine upgrade to be incorporated into FALCON in FY04. This engine included Japanese/English military dictionaries.

FALCON is an acronym for Forward Area Language Converter, a laptop computer and accompanying software that enable users with no foreign language training to translate foreign language documents and determine their military significance. The Forward Area Language Converter (FALCon) software allows a user with no foreign language training to convert a foreign language document into an approximate English translation. With FALCon technology, U.S. troops can triage captured documents in the field and transmit them to linguists for full translation and analysis. A prototype includes a laptop computer, paper scanner, and multiple communication links all enclosed in a specialized case.

Once the documents are captured in the field they must be scanned into the laptop computer via the paper scanner. The scan is passed through the OCR software where it groups the dots (pixels) to characters and groups the characters into words. It compares the words to the built-in dictionary and highlights all the possible errors. Then the document is sent through the MT software. The first dictionary check is for the general language, the second dictionary check looks for words relating to the military that could give the troops an idea of whether it contains useful information and needs to be sent to the linguist for further evaluation.

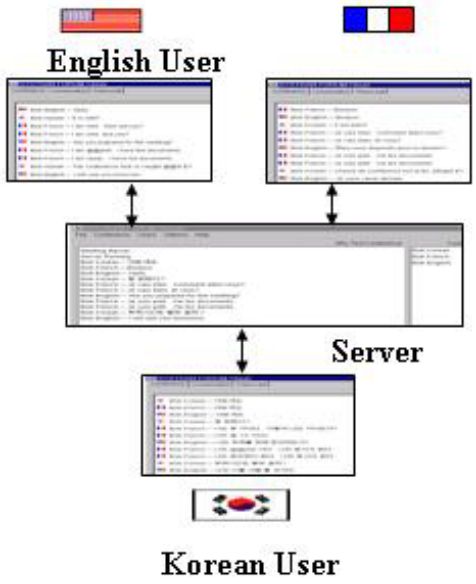
FALCON will be utilized in the following areas:

- Translation of briefings (text only), assessments, personnel related documents, point papers, and orders (bilateral)
- Translation of other foreign language documents for intelligence purposes

For these document translation tasks, evaluation (both quantitative and qualitative) will focus on what the user was able to derive from the translated texts, what the user felt was missing from or uncertain in the translated texts, whether the user felt the text, as translated, was usable for the particular task, what deficiencies in the translation were felt to be critical, and whether the user would seek human translation based on the machine translation.

4.3 Translingual Instant Messaging (TrIM):

The Translingual Instant Messaging (TrIM) tool is an automated forum translation environment that enable participants in a multinational meeting to communicate in their native languages. This expedites rapid response of multinational coalitions by facilitating the collaborative planning process. Similar to a contemporary chat room in that each user will able to send messages to the server, which will broadcast to every member of the discussion. The server will at the same time receive all messages that have been posted by other members of the forum in sequence. The message traffic sent and received by a given user will be in that user's chosen language, translated if necessary by commercial machine translation engines.



Trim will be utilized in the following areas:

- Bilateral/Multilateral staff/operator coordination, e.g.
  - Verification/notification of locations of tactical units/other organizations
  - Coordination of briefings, meetings, and other administrative actions to include personnel issues and political/military issues
  - Coordination in the preparation of orders (ops, frag, warning)
  - Joint Targeting Boards
  - Coordination in defining unit boundaries
  - Determining unit capabilities (combat strength, weapons systems, etc.)
  - Determining battle damage assessment (red/blue)
  - Coordination and dissemination of intelligence reports
  - Coordination of exercise control issues across all battle operating systems

- Establishment and maintenance of group cohesion/understanding in a coalition setting
- Sense-making: the development of group consensus

In evaluating translingual communication tasks mediated by TrIM, attention will be paid to: the efficiency of discourse (amount of time spent in repair sub-dialogues); the ability of the participants to make themselves understood and to understand others; terms or concepts that were particularly difficult to convey in this medium (and that may be helped by additional resources; such as domain-specific dictionaries); overall success or failure of task performance; modes of use of the tool; and user discourse behaviors that effectively compensate for deficiencies of the technology. The translation engine to be used in TrIM at YS45 will not incorporate military dictionaries, but will be included at a later date.

5.0 ASSESSMENT EXECUTION

Training. User training was provided by MARFORPAC/MEC sponsored personnel 18-25 January 2004 at Camp Asaka and Camp Zama, Japan. Training on S-MINDS for the 351st Civil Affairs Command (351st CAC) was conducted 10 January 2004 in their garrison location (Mountain View, CA). Additional training for S-MINDS occurred 26-28 January 2004 during the exercise because available on-site personnel had never received training. This training lasted 2-5 minutes prior to having personnel utilize S-MINDS. TrIM training, including system administrator training, for some I CORPS personnel was conducted at Fort Lewis in October 2003, during installation of an in-garrison TrIM server.

Training in Japan encompassed the following:

- Forward Area Language Converter (FALCON) (SYSTRAN 4.2 web service, a functional equivalent of the Japanese/English engine upgrade to be incorporated into FALCON in April 04)
- Translingual Instant Messaging (TrIM)
- Speaking Minds(S-MINDS, speech/speech)
- Installation instruction (where applicable)
- Identifying/reporting problems/issues
- Troubleshooting

Deployment, System Set-up, Execution, and Data Collection. The LASER tools were used during both the training period and the normal execution of this exercise. The principle goal was to provide a baseline assessment of the military utility of the candidate tools under realistic conditions, and to collect user/administrator feedback. LASER's event schedule was as follows:

- 17-20 Nov 2003 MEC sponsored LASER Focus Team Meeting (Hawaii)
- 19-25 Jan 2004 Arrival of MEC/LASER ACTD personnel on site (Japan)
- 20-25 Jan 2004 LASER tool installation, setup, and training
- 21- 30 Jan 2004 LASER tool employment and evaluation
- 26-30 Jan 2004 Data Collection
- 30 Jan 2004 Departure of MEC LASER ACTD personnel

LASER tools were deployed as follows:

I CORPS, U.S. Army Japan, 3rd MarDiv, & Eastern Army / Cp Asaka

- Forward Area Language Converter (FALCON) (SYSTRAN 4.2 web service)
- Translingual Instant Messaging (TrIM)
- Speaking Minds(S-MINDS, speech/speech)

9th TSC, 116th Support Center (CRAO) / Cp Zama

- Forward Area Language Converter (FALCON) (SYSTRAN 4.2 web service)
- Translingual Instant Messaging (TrIM)

6.0 ASSESSMENT RESULTS. The personnel who utilized the Laser tools and completed survey were very diverse. Demographic of personnel who answered surveys are provided below.

- (4) Government Employees
- (11) Army and Marine Officers
- (1) Japanese Self Defense Officer
- (8) Army and Marine Staff NCOs
- (6) Army and Marine NCOs
- (5) Marine Non-Ranks

Note: There were (27) Japanese Self Defense Force Enlisted Military personnel who did not fill out the Demographic Survey due to their limited English. The S-MINDS Interviewee Questionnaires were translated to Japanese prior to administering the surveys. Comments made in Japanese were translated to English at a later date.

6.1 S-MINDS Observations. From an operational standpoint, considering the fluid pace of the exercise battle space, the S-MINDS translation system was functionally limited. There were too few scenarios available, and the type of questions presented during the interview process did not reflect accurate depictions of military operations. The technology employed by the S-MINDS system, however, was very durable and easy to use. The mini-laptop was extremely portable and capable of extended battery powered operation in excess of (8) hours. The operating system was stable and did not crash once during the exercise. The quality and accuracy of the translations by S-MINDS was acceptable and understood by the non-English speakers during the interviews. The few errors in translation by S-MINDS were attributable to poorly worded pre-programmed phrases, or bad enunciations by the speaker.

6.1.2 S-MINDS results from questionnaires. Three scenarios were used during the evaluation: Checkpoint, Refugee, Injury Evaluation, and Looking for a Person. The number of questions ranged from 8-19 depending on scenarios. The “failed to recognize” or incorrect response ranged from .04 to 40 percent.

SMINDS Interviewers (total of 30 completed)

	N/A	Disagree	Agree	Strongly Agree
1. The topics available in SMINDS effectively support scenario.			23	7
2. .The questions within the topic I used were sufficient		2	19	9
3. It was easy to conduct the queries for this scenario via SMINDS		2	19	9
4. An interviewer with no foreign language skills could have used SMINDS effectively to complete this scenario.		1	15	14
5. SMINDS translations accurately captured the intended meaning of original messages during this scenario.		1	17	11
6. The word choice in SMINDS translations was accurate for this scenario	1		19	10
7. The word order in SMINDS translation was accurate for this scenario	1	1	18	10
8. SMINDS translations were useful for identifying critical information in messages	1	1	19	9
9. SMINDS provided timely translations		1	13	16
10. SMINDS reduced the time needed to convey or acquire information.	2	1	12	15

Significant comments from users:

- Scenarios need to be expanded.
- Coordinate with military professional to create actual scenarios from start to finish in logical order.
- I had trouble with program understanding what I was saying, maybe because I'm from Texas.
- Not too bad if you have enough time to conduct the interview.
- Useful but need to be able to vary in responses and answers.
- It should wait longer for you to speak, a few times it didn't recognize because interviewee was slow to answer.
- It was very surprising how well it translated between the two of us. Wish I could see more of this system.
- Outstanding system and should be used to make communication easier for our forces.
- Good, but will be great with some more expansion.
- Very easy to use.

S-MINDS Interviewees Questionnaire (total of 27 completed)

	N/A	Disagree	Agree	StronglyAgree
1. It was easy to communicate my answers via S-MINDS during this scenario.		3	11	13
2. Communication via S-MINDS was accomplished quickly		1	17	9

Significant comments from users:

- Have to use simple Japanese to be understood.
- If answering too fast or too slow, the device didn't work.
- The Japanese was simple and easy for a child to understand.
- It was easy to understand because of accurate Japanese.
- It is very convenient and easy to use. Please continue brush up of this system.
- One negative part of the use of the translation device is that it requires the cooperation of the

interviewee. If the person is answering right thing but in a wrong way, such as too fast or unclear, the device didn't work.

- It would be helpful and I would like to use.
- It is not good at long conversation. Sometimes it made mistake, especially time or numbers.

S-MINDS End of Exercise Questionnaire (total of 1 completed)

	N/A	Disagree	Agree	StronglyAgree
1. The topics available in SMINDS effectively support operations.			1	
2. The questions within each topic are sufficient.			1	
3. It is easy to conduct queries via SMINDS			1	
4. Individuals who have no foreign language skills can use SMINDS effectively				1
5. SMINDS translations accurately captures the intended meaning of the original message				1
6. The word choice in SMINDS translations is accurate.				1
7. The word order in SMINDS translation is accurate.				1
8. SMINDS translations can be used to identify critical information in the message.				1
9. SMINDS provides timely translations.				1
10. SMINDS reduces the time needed to convey or acquire information.			1	
11. SMINDS is easy to set up				1
12. SMIND is easy to tear down.				1
13. SMINDS is easy to pack.				1
14. SMINDS software is easy to configure for use.				1
15. SMINDS easily recognizes individual voices.				1
16. SMINDS size/weight is suitable for mission operations.				1
17. SMINDS is rugged enough for the operational environment			1	
18. Power requirements for SMINDS were suitable for operational environment.				1
19. SMINDS translation software did not conflict with other software programs.			1	
20. SMINDS did not interfere with any other war fighting equipment.			1	
21. The training prepared me adequately for use of SMINDS during the exercise.			1	
22. Given the training I received, I would be able to us SMINDS after the exercise without the developers to assist me.				1
23. If fielded, initial training on SMINDS would best be conducted at the unit level.				1
24. Continued, expert use of SMINDS will require periodic refresher training.			1	
25. I would like to have more training in the following areas prior to using SMINDS.	Program questions and answers			
26. SMINDS is easy to learn				1
27. SMINDS software interfaces are user friendly				1
28 Accessing mission-specific phrases and words is easy				1

with SMINDS.				
32. SMINDS is easy to service and maintain.				1
33. SMINDS operates with minimal failures.			1	
36. Overall, compared to the current system/procedures, SMINDS improved my ability to complete a mission.			1	
37. SMINDS enhances productivity.				1
38. The trained TTPs to operate SMINDS were adequate.				1

6.2 FALCON/SYSTRAN Observations. The sample obtained for this translation technology was small because not many users had their computers configured correctly despite an exercise-wide email which provided instructions for doing so. Configuration support was provided to those users who requested it. In addition, not all users connected to the FALCON web service in time to make use of the document translation capability provided. Several users required hard copy document translation and the FALCON/SYSTRAN implementation for YS45 was only capable of translating electronic documents. Optical character recognition (OCR) for Asian language character sets was not available with the system and this hampered user interactions with the technology.

The most active users of the FALCON/SYSTRAN tool were in the 9thTSC, who used it to translate Japanese OPORDERS and LOG annexes from the Japanese Eastern Army G4 at Camp Asaka. The translations provided almost always had minor problems (with subordination, modification of verbs and nouns, etc), however, there were only rare instances where the mistranslations were so severe as to obscure the intent of the original text. It was noted that the difference between a good translation and an unintelligible one could be made by simply putting a period or question mark in the right place - leaving it out of a declarative or interrogative could throw off the translation.

Two Japanese LNOs assigned to the 9th TSC used FALCON/SYSTRAN extensively. The night shift LNO used it to translate 20-30 page briefings into Japanese. After some minor editing, and comparing the translation to the original to make sure there were no inaccuracies, he would email them off to the Eastern Army HQ. The day shift LNO used FALCON to translate MSEL derived requests from elements within the 9thTSC (tasking requests, RFIs, etc) into Japanese, and then sent them to his counterparts at Camp Asaka. Both LNOs commented that while the capability was not perfect, it saved them much time in generating acceptable, communicative translations.

6.2.1 FALCON/SYSTRAN results from questionnaires.

FALCON/SYSTRAN Questionnaire (total 7 completed)

	N/A	Disagree	Agree	Strongly Agree
1. Systran language dictionaries effectively support operations.	1		3	4
2. Individuals who have no foreign language skills can use Systran effectively.		1	3	4
3. Systran translations accurately capture the intended meaning of original message.		2	6	
4. Systran provides useful translations of the following types of messages				
a. Order of battle	2		3	1
b. Maneuver information	2		3	1
c. Tasking information	1		4	1
d. Commander's intent	2	2	3	
e. Logistics information	2		4	1

5. The word choice in Systran translations is accurate.		1	7	
6. The word order is Systran translations is accurate.		1	5	1
7. Systran translations can be used to identify critical information in the message.	1	2	2	3

Significant comments:

- It was a good general translation, but Japanese are very meticulous and they require perfection.
- Very easy to use.
- Saved tons of time.
- Not exactly capture intended message, but great start.
- I translated a paragraph from English to Japanese and then had a Japanese translator fix the translation, which I then translated, back from Japanese to English. It was similar but hard to understand.
- Common phrases okay, military usage of terms needed. Suggest a menu where one picks logistics, personnel, or operations and tailor dictionary.
- The military glossary was noticeably robust.
- Poor translation tends to hamper interoperability.
- Some distortion according to Japanese.
- Some translations did not capture [intended meaning of the original language]
- Mistranslations that were so big as to disguise the [meaning] of…the text were rare.

6.3 **TrIM Observations.** The chat model was popular among users and fairly intuitive; however, because ofthe absence of excerise driven scenarios and the difficulty in coordinating use within the JSDF, not many users were able to interact with the technology. Domain name service issues on the EXLAN also impeded ready access for the 9th TSC and USARJ. As with the FALCON/SYSTRAN tool, an exercise-wide email provided instructions for installing the TrIM components. Configuration support was provided to users who had difficulty and requested help. Those users who were able to obtain access, and configure their systems correctly were able to dialog with their Japanese counterparts. Additional coordination between users was required since a TrIM buddy list (address book) , to enable users to find chat participants, was not prepared for YS45. The quality of the discourse between users was average. Most users were able to communicate their ideas effectively, although some Japanese users noted that the accuracy of the translation wasn't very precise. Unlike the FALCON/SYSTRAN tool, military dictionaries, which would have facilitated operational requirements greatly, were not provided in this implementation of TriM.

6.3.1 TrIM results from questionnaires.

TrIM Questionnaire (total of 3 completed – USARJ/G1, I CORPS/116CAV, I CORPS/64ROC)

	N/A	Disagree	Agree	StronglyAgree
1. TrIM language dictionaries effectively support operations.		1	1	1
2. It is easy to communicate via TrIM.			2	1
3. Individuals who have no foreign language skill can use TrIM effectively.			1	2
4. TrIM translations accurately captures the intended meaning of the original message		1	1	1
5. TrIM provides useful translations of the following types of messages				
a. Order of battle	2		1	

b. Maneuver information	1		1	1
c. Tasking information	1		1	1
d. Commander's intent	2		1	
e. Logistics information	1		1	1
6. The word choice in TrIM translations is accurate.		1	1	1
7. The word order in TrIM translation is accurate.		1	2	
8. TrIM translations can be used to identify critical information in the message.	1		1	1
9. TrIM provides timely translations.			1	2
10. TrIM reduces the time needed to convey or acquire information.			3	
11. TrIM is easy to set up			1	2
12. TrIM is easy to tear down.	1			2
13. TrIM is easy to pack.	1		1	1
14. TrIM software is easy to configure for multiple languages.	1		1	1
15. TrIM size/weight is suitable for mission operations.	1		1	1
16. TrIM is rugged enough for the operational environment	1		1	1
17. Power requirements for TrIM were suitable for operational environment.	1		1	1
18. TrIM software did not conflict with other programs.			2	1
19. TrIM did not disrupt network communication nodes.			2	1
20. After the training, I felt I understood how to use TrIM.			3	
21. TrIM features were adequately described during training.			3	
22. The training was logical and organized.	1		2	
23. The level of detail was appropriate.	1		2	
24. TrIM training was the appropriate length.	1		2	
25. Sufficient examples were covered during TrIM.	1		2	
26. Hands on activities during the training were helpful.	1		2	
27. The training aids were helpful.	3			
28. Questions were addressed to my satisfaction.	2		1	
29. Given the training I received, I would be able to use TrIM after the exercise without the developers to assist me.	2		1	
30. If fielded, initial training on TrIM would be best conducted at the unit level.			2	
31. Continued, expert use of Trim will require periodic refresher training.	1	1	1	
33. TrIM is easy to learn			3	
34. TrIM software interfaces are user friendly.			3	
35. Accessing mission specific phrases and words is easy with TrIM.		2	1	
36. TrIM manual is easy to use.	2		1	
37. TrIM help menus are helpful.	1		2	
38. TrIM is easy to troubleshoot.	2		1	
39. TrIM is easy to service and maintain.	2		1	
40. TrIM operates with minimal failures.	1		2	
43. Overall, compared to current system/procedures, TrIM improved my ability to complete a mission.			1	2
44. TrIM enhances productivity when conducting foreign language coordination and disseminating information.			2	1
45. The trained TTPs to operate TrIM were adequate.	2			1

46. I would us TrIM right now in my day-to-day mission if it were available.			2	1

Significant comments:

- Good for general, need work for ops support.
- Translations accuracy 50/50, good in general, less with military terms.
- Suggest on-line tutorial.
- Had difficult time getting Japanese units to enter chat rooms.
- Must be careful with word choice.
- Didn't receive training, taught myself.
- Those who used the tool had positive comments.

7.0 CONCLUSIONS.

It should be noted that all three technologies would have produced better results had their implementation been better executed. All three platforms were capable of very basic translation chores but their full utilization was hampered because they were not imbedded into exercise parameters from the beginning. Data collection for this effort proved challenging as well, because the questionnaires were all written in English. This presented a huge stumbling block for the non-English speakers participating in the evaluation.

The Sehda product, Speaking Minds (S-MINDS), garnered the most favorable impressions from the target population. While the basic premise S-MINDS was designed for could not adequately be duplicated during the exercise, most users were successful in using the technology to conduct the programmed scenarios. As long as the Japanese phrases used in the dialogs were kept at the most elementary level, interview outcomes were successful.

The Forward Area Language Converter (FALCON/SYSTRAN 4.2 web service) is a technology with great possibilities but was hindered because it could not be employed with hard copy documents. Translation accuracy was average overall, and those users that successfully utilized SYSTRAN felt that it was a great tool and would be even more useful had it been capable of translating their hard copy documents.

The Translingual Instant Messaging (TrIM) technology was underutilized by the users. Coordination within the exercise and user unfamiliarity with system configuration on their client computers hindered the use of this technology. The chat model was popular and the fidelity of the translation using the LogoMedia engine without military dictionaries, while good for basic exchanges, was not precise enough for operational discourse between English and Japanese speakers.

In sum, S-MINDS, given the right environment, planning, and coordination with key Intelligence Community operatives, military law enforcement agencies, and perspective coalition partner nations, is a technology that will be valuable in easing mundane translation duties by a full time linguist in the field. Both TrIM and FALCON/SYSTRAN, once military dictionary issues have been resolved and appropriate OCR capabilities incorporated respectively, will enhance the warfighters ability to stay fluid in a dynamic battle space while interacting with non-English speaking counterparts.

8.0 RECOMMENDATIONS

- **General**

  Build actual scenarios
  Provide questionnaires in the target language
  Assess in future exercises

- **S-MINDS**

  Lengthen the pause between speakers
  Provide a wireless microphone
  Include an audible speaker with the system

- **TrIM and FALCON**

  Provide military dictionaries, categorized by domain and add Asian language OCR (FALCON)