Employing Net Centric Technology for a Mobile Weather Intelligence Capability

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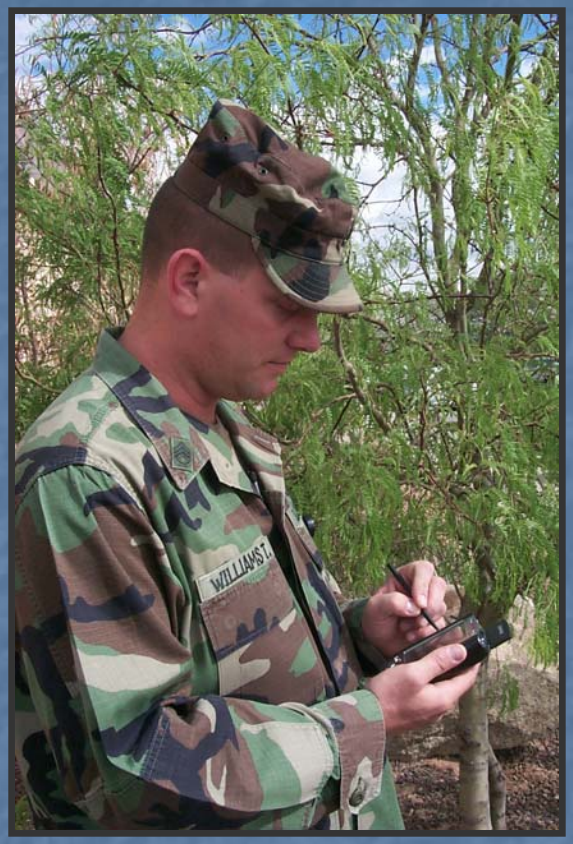
BACKGROUND

The environment can adversely affect weapon systems and military operations at all echelons. A priori and near real-time knowledge of these effects (both over time and space) can assist the Commander and Soldier in both the planning and execution phases of missions.

OBJECTIVE

Develop weather related Actionable Intelligence (e.g., decision aids, alerts, situational awareness, etc) to enable rapid visualization and understanding of critical information. Provide this Intelligence via net centric means* on a mobile device to empower lower echelon users.



*Examples of net centric technologies include distributed computing (e.g., web services and Java remote method invocation), wireless and mobile computing, network protocols and shared dataspaces

APPROACH

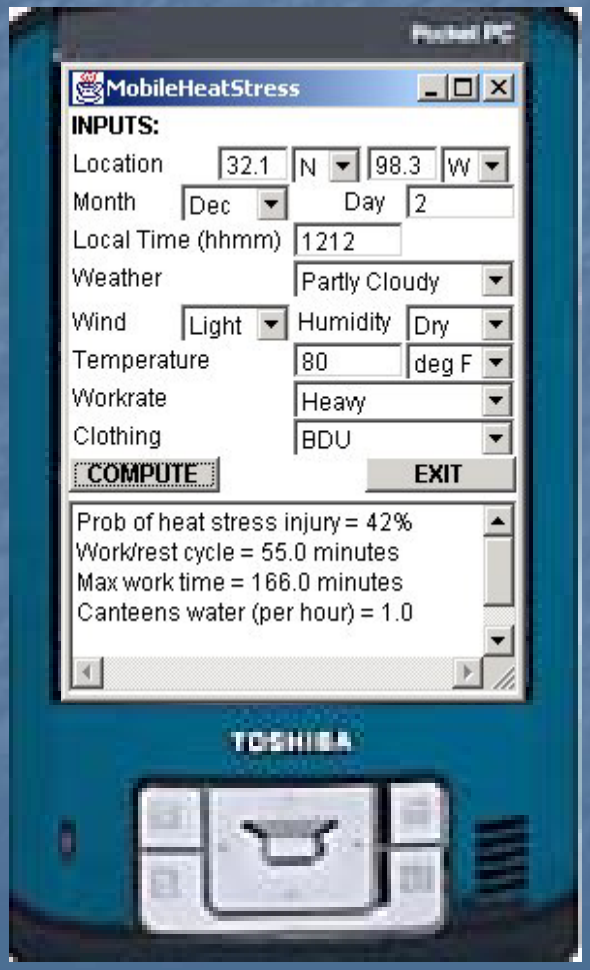
- Continually leverage rapid advances in hardware technology to host applications on a highly portable mobile computing device

- Develop applications using emerging & existing software standards (e.g., Web services, XML, Java) for portability and rapid transition of the technology to the Warfighter

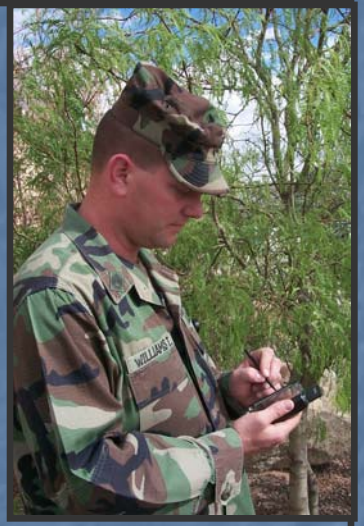
- Develop standalone applications for the mobile device where possible to eliminate requirement for a remote server

PROTOTYPE MOBILE PLATFORM

Toshiba e800 personal digital assistant (PDA)



- 5.3” x 3.0” x 0.6”
- Color display
- 128 MB SDRAM



- 6.8 ounces
- 400 MHz processor
- 240x320/480x640 resolution
- Embedded microphone/speaker
- Integrated Wi-Fi (802.11b)
- Integrated secure digital slot
- Integrated Compact Flash slot

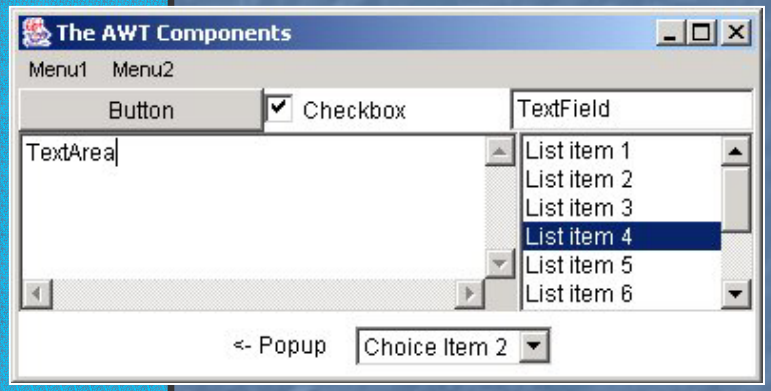
SOFTWARE ENVIRONMENT

Computational and Information Sciences Directorate

Battlefield Environment Division

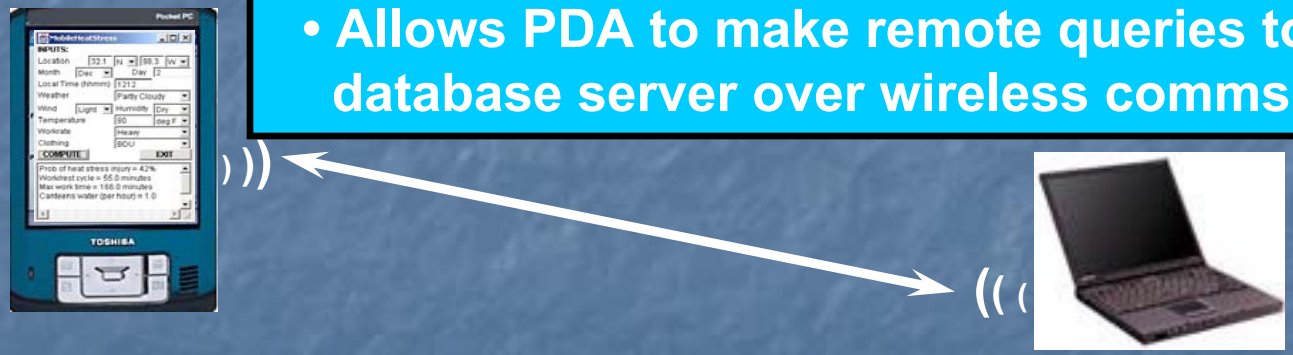
Java for most application coding

- Fairly robust programming and graphical user interface capabilities
- Very portable code (tested under Win2000, PocketPC OS and Solaris Unix with no recompilation)
- Small footprint binaries (10's of Kb)



Java remote method invocation for client/server

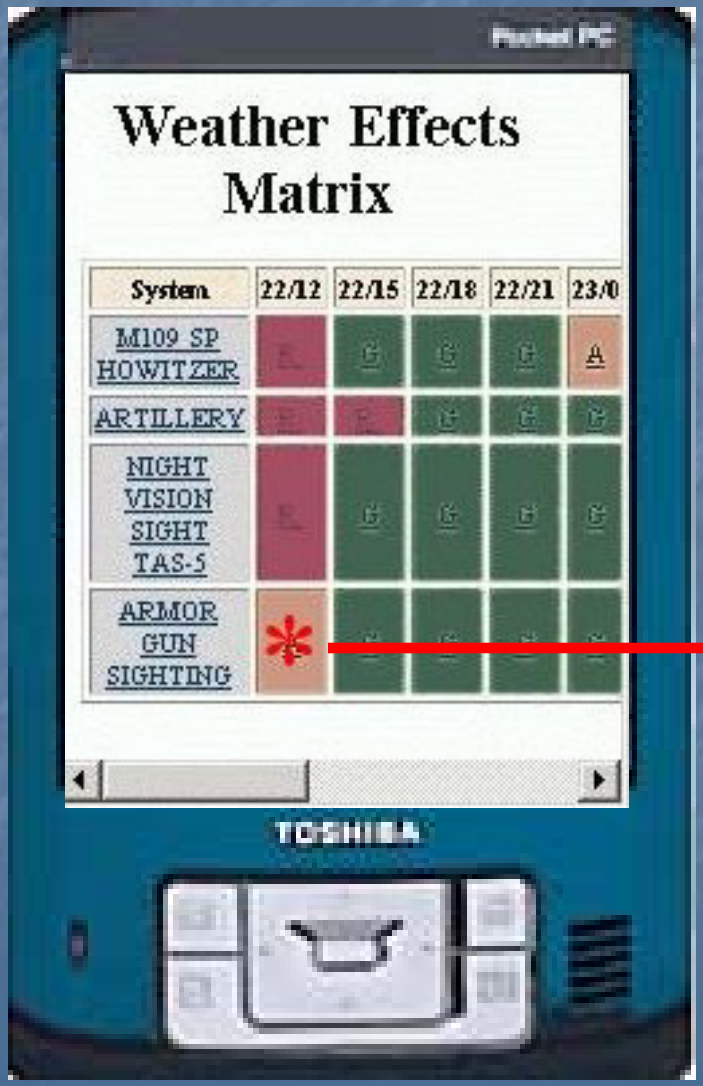
- Allows PDA to make remote queries to a relational database server over wireless comms (802.11)



Relational database software on secure digital card

- Applications can query local DB if wireless comms unavailable

INTEGRATED WEATHER EFFECTS DECISION AID (IWEDA)



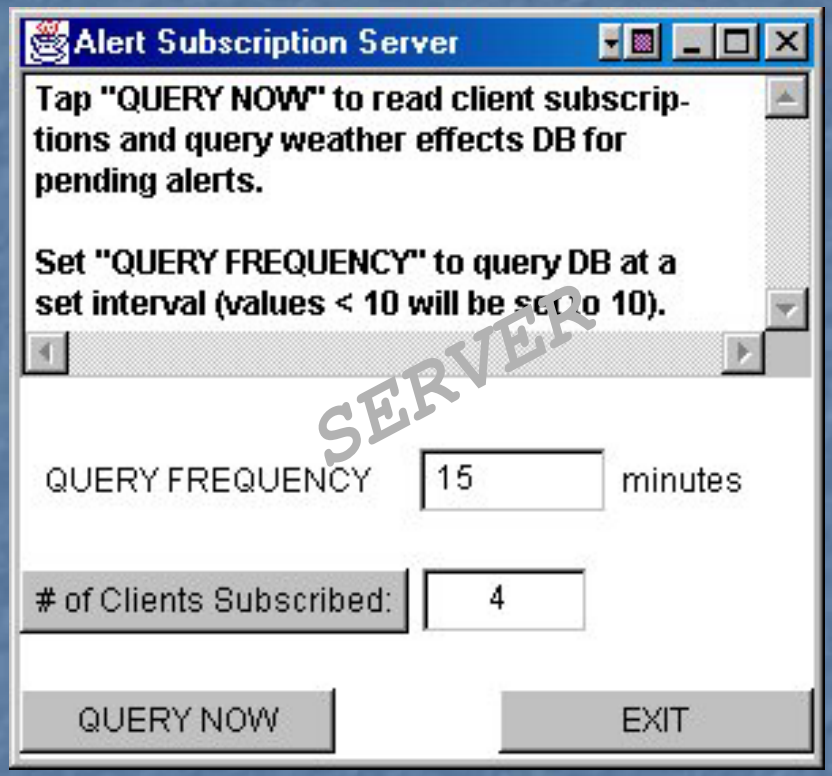
- Provides critical environmental effects information
- Inventory of 300+ weapon systems and operations (numerous foreign)
- Color coded impacts
- Static map overlay capability
- Remote and local server versions
- Matrix cell tap retrieves the basic weather impacts:

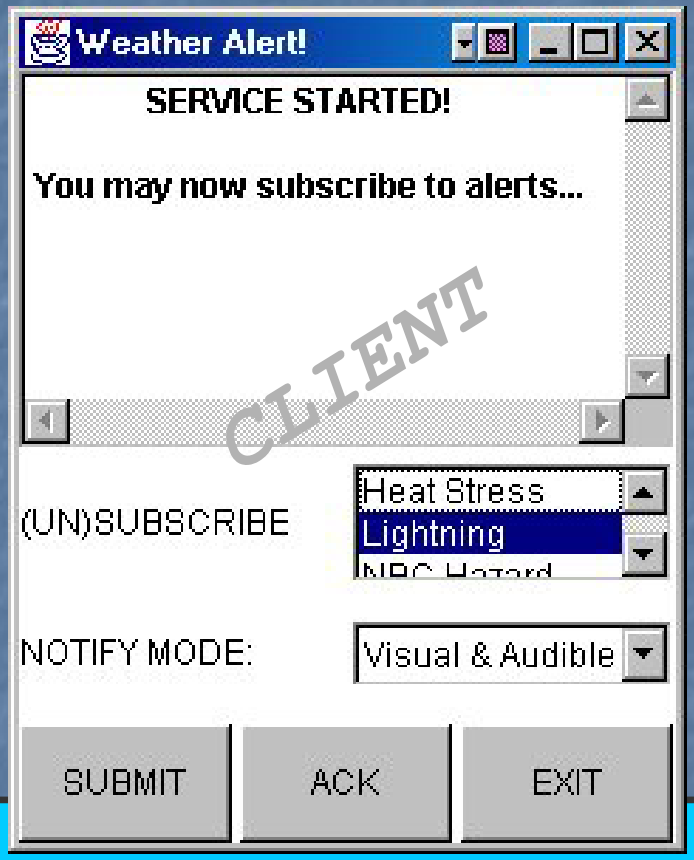
Condensed Impacts

System name: **ARMOR GUN SIGHTING**
Forecast period: **22/12**

System ARMOR GUN SIGHTING has marginal impact: ***Low Visibility***

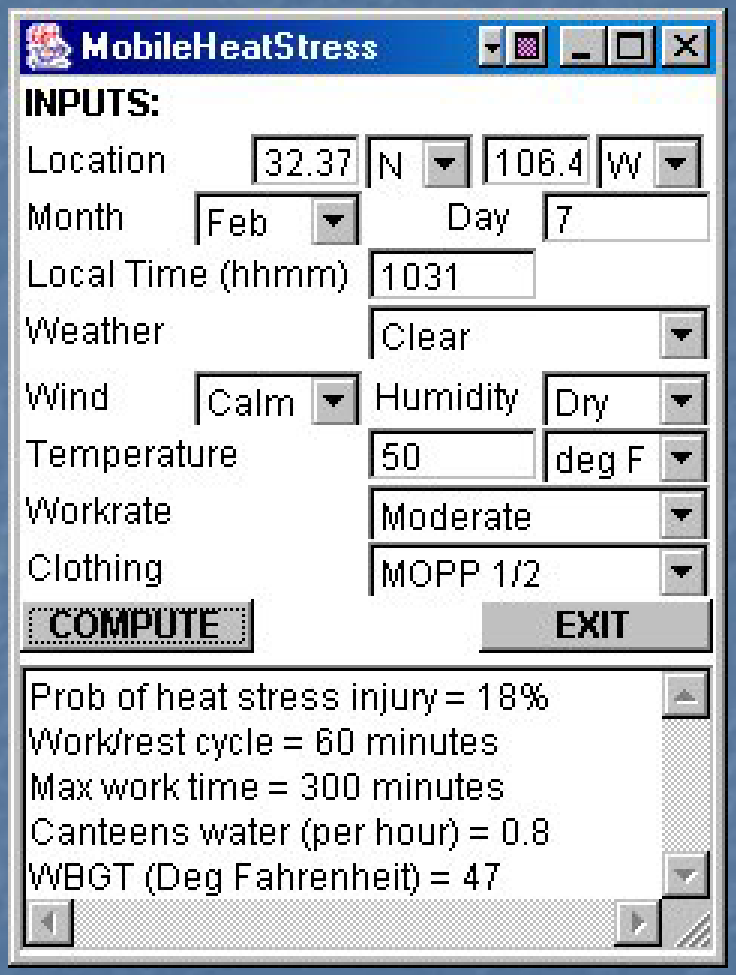
WEATHER ALERT SUBSCRIPTION





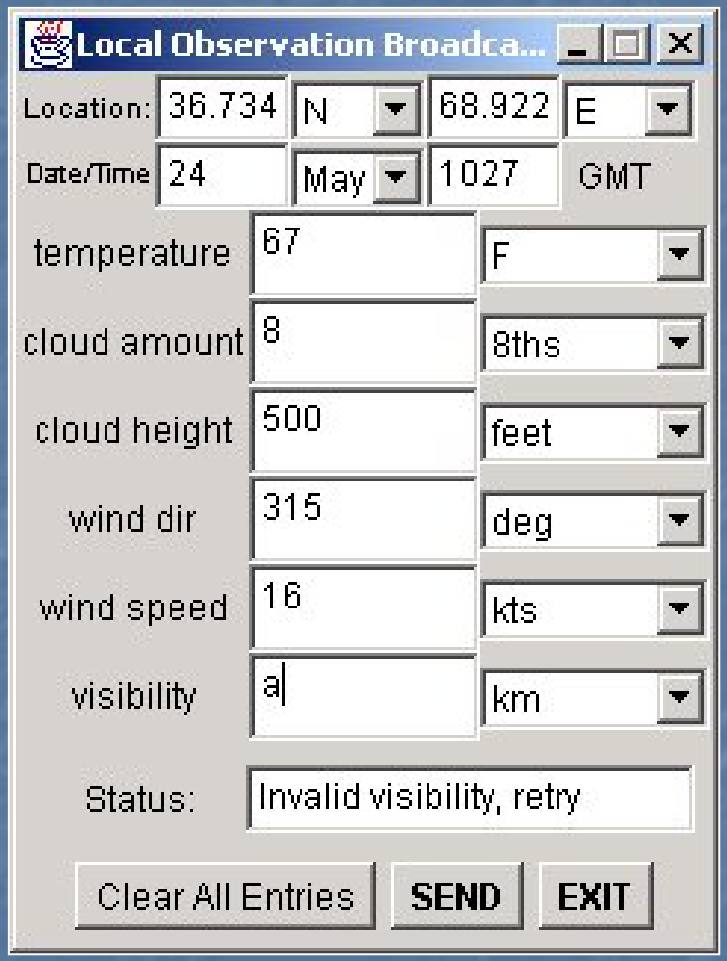
- Two alert modes (visual/visual&audible)
- Several alert subscription choices
- Integrated w/GPS capability to automatically set geographic location (spatially dependent alerts database)
- Requires wireless comms back to a remote server

MOBILE HEAT STRESS



- Provides critical heat stress parameters based solely on local input of data
- Underlying physics based algorithms from USARIEM
- Current date/time and location are automatically set using Java utilities and GPS output (if available)
- Java GUI; USARIEM algorithms and insolation calculation in a C dll accessed via Java Native Interface
- Input is error trapped for valid entries

SPOT WEATHER REPORT

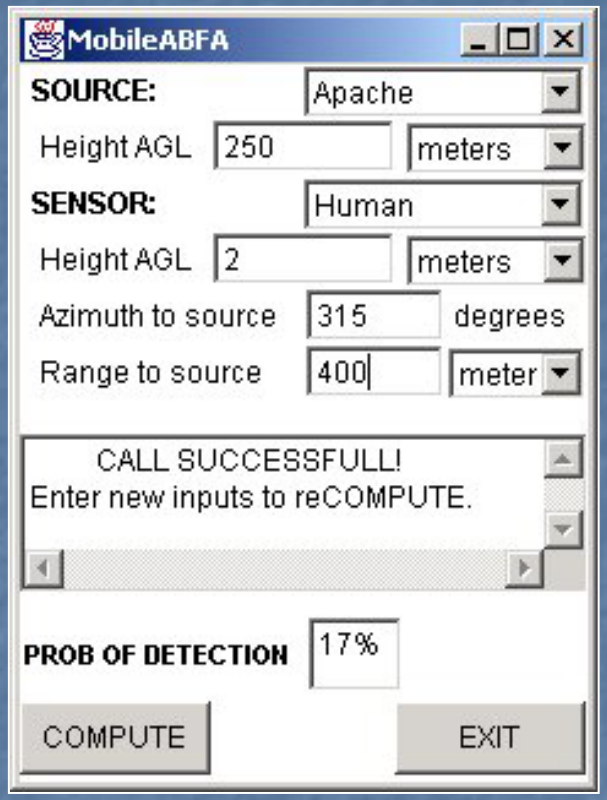


- Allows entry and transmission of local weather observation to remote server
- Potential uses: initialization of a prognostic or diagnostic high resolution weather model; in a CBR diffusion model; etc.
- Current date/time and location are automatically set using Java utilities and GPS output
- As with other mobile apps, input is error trapped for valid inputs

PROTOTYPE APPLICATIONS

Mobile Acoustic Propagation Decision Aid:

Provides probability of detection of an acoustic source given a sensor and the range & azimuth between them



High Resolution Objective Analysis:

- Real time 2-D objective analysis of sparse meteorological observations (e.g., wind speed, temperature, etc)
- Provides a regularly spaced high resolution analysis field
- Output potentially can be used as input for various other applications at locations where direct measurements are not available

LEGACY APPLICATIONS

Two Pascal applications running under DOS emulator:

- 3D Chemical Hazard – Provides prediction of the horizontal and vertical extents of chemical vapor hazard to low flying aviators

- Night Vision Goggles – Provides guidance (text and graphics) on favorable times of NVG use as a function of predicted ambient illumination.

FUTURE EFFORTS

- High resolution 3-D meteorological analysis capability
- Interactive mapping capability
- Collaborative software agents
- Investigation of JavaSpaces* technology for implementation of distributed applications and data
- Additional decision aids/applications
- Partner with an ongoing program or participate in an exercise/demonstration to evaluate utility of products

*A JavaSpace is a network accessible, shared memory repository for reading, taking and writing of objects via loosely coupled processes