

# Humanproof™



## Development of an Integrated, User-Friendly Authoring Tool for ITSs

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## GIFT

“GIFT is an empirically-based, service-oriented framework of tools, methods and standards to **make it easier to author** computer-based tutoring systems (CBTS), manage instruction and assess the effect of CBTS, components and methodologies”

## GIFT Authoring Challenges

- Domain Knowledge File (DKF)
  - DAT developed to support authoring adaptive training
  - Intricacies of the system have proven too complex for average users
    - Nested hierarchies, interrelationships among components (assessments, strategies, triggers)
- Disconnect between GIFT and Training Applications
  - Gateway for comms between GIFT and TA
  - No real-time comms – e.g., during authoring of scenarios and assessments
  - Work with GIFT and TA asynchronously, independently

## Authoring with GIFT Wrap – 1<sup>st</sup> Generation

- Integrated with ARES
- Create COL (survey) questions
- Select survey response options directly from the TA's content creation interface (i.e., ARES terrain map)
- User-friendly tool
- Eliminated the disconnect



## Authoring with GIFT Wrap – 2<sup>nd</sup> Generation

- Currently under development
- Extend existing GIFT Wrap functionality by...
  1. Providing a user-friendly tool for creating, configuring, and managing a DKF,
    - i. Support for existing and future RTAs
  2. Further reducing the disconnect between authoring in GIFT and authoring within a training application's content creation environment

## Authoring with GIFT Wrap – 2<sup>nd</sup> Generation

- User-friendly authoring interface features
  - Tasks and Concepts has been restructured into a tree-like menu of “Tutoring Events”
  - Always visible - view the entire set of Tasks and Concepts at the preferred level of detail, collapsing/expanding the menu for each Task
  - Purposely designed to guide the user through each step - creating a Task, Start Trigger, Concepts, End Trigger
  - Feedback on the user’s progress is provided in the form of checkmarks indicating status (e.g., completed)

The screenshot shows a web browser window titled "A Web Page" with the URL "http://gftexchange.com". The main content area is titled "Learner Task" and includes a "Return to GAT" button. On the left, there are two panels: "Exchange Files" containing "LandNav 101" and "Tutoring Events" containing a list of events: "LandNav Symbols", "Start Trigger", "Bridge Symbols", and "Suppl Terrain Features". The "Suppl Terrain Features" event is selected. A modal window titled "Tutoring Events" is open, showing a list of events with checkboxes: "LandNav Symbols" (unchecked), "Start Trigger" (checked), "Bridge Symbols" (checked), and "Suppl Terrain Features" (checked and highlighted). Below the list are options for "End Trigger" and "Click to add a Task". The main task configuration area includes "Task Type" (Check On Learning), "Use Existing" and "Create New" buttons, and a "Name" field with "Suppl Terr Ftr". The "Question Text" field contains "Which of the following is a supplementary to". The "Response Options" section shows three items: "Entity Gu1E3", "Entity CompR", and "Entity Bridge". On the right, there are three "Assessment Level" dropdown menus, all set to "Below Expectation".

## Authoring with GIFT Wrap – 2<sup>nd</sup> Generation

- Redesigned UI for configuring RTAs and Strategies
  - RTAs now framed as “Learner Tasks” or activities
    - Complete during use of the TA to evaluate concept mastery
  - Each Condition Class has its own custom-designed UI based on the assessment schema defined in the source code
  - Filtering - only those Condition Classes compatible the TA made available to the user during the authoring workflow
    - E.g. Layout Task – ARES
  - No programming skills required
  - Common UI elements used where possible



A Web Page

[← Return to GAT](#)

**Exchange Files**

LandNav 101

*Click to create a new File*

**Tutoring Events**

- LandNav Symbols
- Start Trigger
- Bridge Symbols
- Click to add a Concept*
- End Trigger

*Click to add a Task*

**Learner Task**

Task Type Layout Task    Use Existing Create New    Name Bridge Symbols

Layout Task Instructions

Place each of the following bridge icons in the proper location on the map

Entities to be Placed on the Map by the Learner

|  |  |                |   |   |   |   |  |           |   |
|--|--|----------------|---|---|---|---|--|-----------|---|
|  | Entity <span style="border: 1px solid gray; padding: 2px;">Bridge 1</span> | End Location X | <span style="border: 1px solid gray; padding: 2px;">6436.503</span> | Y | <span style="border: 1px solid gray; padding: 2px;">2757.004</span> | Z | <span style="border: 1px solid gray; padding: 2px;">0</span> | Tolerance | <span style="border: 1px solid gray; padding: 2px;">30</span> Units |
|  | Entity <span style="border: 1px solid gray; padding: 2px;">Bridge 2</span> | End Location X | <span style="border: 1px solid gray; padding: 2px;">5436.503</span> | Y | <span style="border: 1px solid gray; padding: 2px;">4757.004</span> | Z | <span style="border: 1px solid gray; padding: 2px;">0</span> | Tolerance | <span style="border: 1px solid gray; padding: 2px;">35</span> Units |
|  | Entity <span style="border: 1px solid gray; padding: 2px;">Bridge 3</span> | End Location X | <span style="border: 1px solid gray; padding: 2px;">5436.503</span> | Y | <span style="border: 1px solid gray; padding: 2px;">4757.004</span> | Z | <span style="border: 1px solid gray; padding: 2px;">0</span> | Tolerance | <span style="border: 1px solid gray; padding: 2px;">40</span> Units |
|  | Entity <i>Click plus button to add another entity</i>                      |                |   |   |   |   |  |           |   |

Layout Task Assessment Logic

2 out of 3 entities placed in End Location = At Expectation

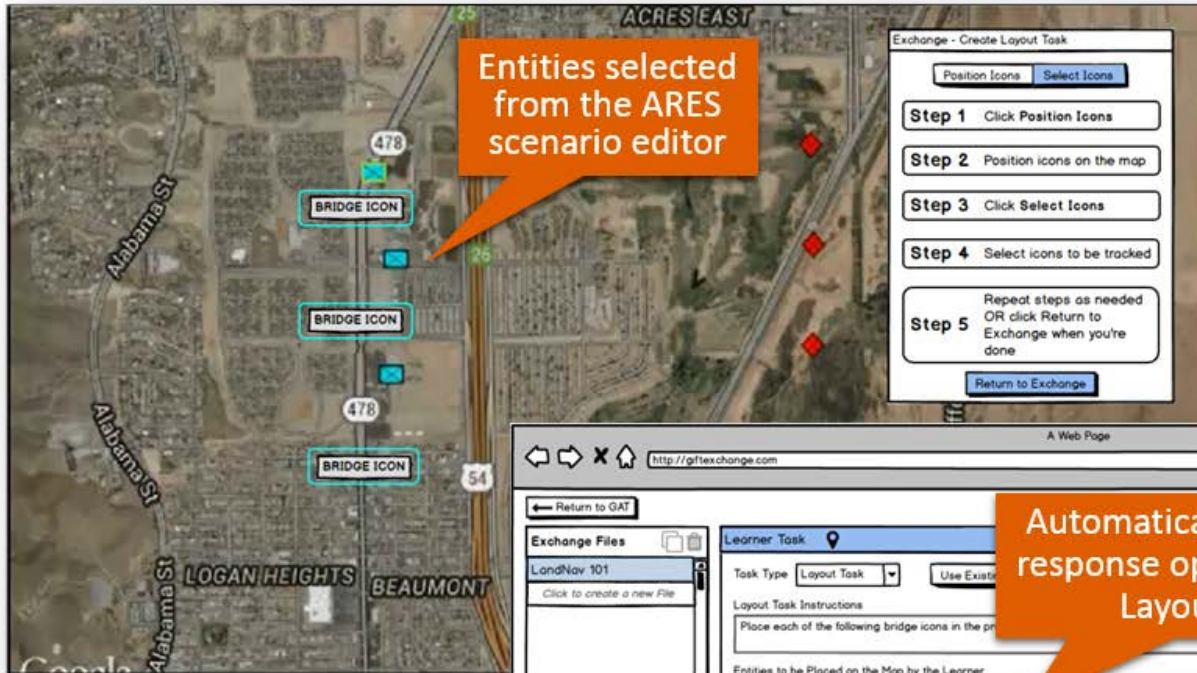
1 out of 3 entities placed in End Location = Below Expectation

3 out of 3 entities placed in End Location = Above Expectation

**Strategy**

## Authoring with GIFT Wrap – 2<sup>nd</sup> Generation

- Blended Authoring Environments
  - GIFT Wrap – TA Integration
  - Allows users to add response options for the COL and Layout Task by selecting map icons directly from the ARES scenario map
  - Eliminates constantly toggling between the GIFT Wrap and ARES, manually entering entity IDs one-by-one
    - Reduces the time required to author such assessments
    - Decreases the likelihood for entry / selection errors
  - The creation of Tasks, Concepts, RTAs, and Strategies now all in one place



Exchange - Create Layout Task

**Step 1** Click Position Icons

**Step 2** Position icons on the map

**Step 3** Click Select Icons

**Step 4** Select icons to be tracked

**Step 5** Repeat steps as needed  
OR click Return to Exchange when you're done

← Return to GAT

Exchange Files

LandNav 101

Click to create a new File

Tutoring Events

- LandNav Symbols
- Start Trigger
- Bridge Symbols
- Click to add a Concept
- End Trigger
- Click to add a Task

Learner Task

Task Type: Layout Task

Layout Task Instructions

Place each of the following bridge icons in the p...

Entities to be Placed on the Map by the Learner

|                                     |        |   |              |   |          |   |          |   |   |           |    |       |
|-------------------------------------|--------|---|--------------|---|----------|---|----------|---|---|-----------|----|-------|
| <input checked="" type="checkbox"/> | Entity | Bridge 1                                | End Location | X | 6436.503 | Y | 2757.004 | Z | 0 | Tolerance | 30 | Units |
| <input checked="" type="checkbox"/> | Entity | Bridge 2                                | End Location | X | 5436.503 | Y | 4757.004 | Z | 0 | Tolerance | 35 | Units |
| <input checked="" type="checkbox"/> | Entity | Bridge 3                                | End Location | X | 5436.503 | Y | 4757.004 | Z | 0 | Tolerance | 40 | Units |
| <input type="checkbox"/>            | Entity | Click plus button to add another entity |              |   |          |   |          |   |   |           |    |       |

Layout Task Assessment Logic

|                          |        |   |                                   |  |
|--------------------------|--------|---|-----------------------------------|--|
| <input type="checkbox"/> | out of | 3 | entities placed in End Location = |  |
| <input type="checkbox"/> | out of | 3 | entities placed in End Location = |  |
| <input type="checkbox"/> | out of | 3 | entities placed in End Location = |  |

Strategy

## Authoring with GIFT Wrap – 2<sup>nd</sup> Generation

- 1<sup>st</sup> generation of GIFT Wrap presented the COL authoring UI directly alongside the ARES scenario editor within the same page / window
- Designed to support a one-screen solution,
  - Expended a significant portion of the overall screen real estate
- 2<sup>nd</sup> Generation goals
  - Retain the one-screen design,
  - Create a framework that would support authoring additional Condition Classes
  - Improve the overall usability of the tool

## Authoring with GIFT Wrap – 2<sup>nd</sup> Generation

- Overlay UI adopted
  - Distinct from the background to avoid confusion between the two environments
  - Presented on top of the underlying screen and may be repositioned as to not obscure or block access to content
  - Avoids distortion / reduction of real estate available for the TA's content creation tools
  - Guides users through each step of authoring Condition Classes via a simple, visual guide (i.e., numbered steps) through the required sequence of actions

## Authoring with GIFT Wrap – 2<sup>nd</sup> Generation

- Overlay UI adopted
  - Users can pause work with the Condition Class and easily switch to editing the TA's configuration (e.g., adjusting the location entities on a VBS map)
  - Presents only a sub-set of functionality (i.e., selecting icons) required to configure the Condition Class
    - Rather than all associated settings (e.g., query text, assessment logic) reducing the size requirement of the overlay and use of valuable screen space

ARES UI

The screenshot displays a satellite map interface titled "ARES UI". The map shows a residential area with streets labeled "Alabama St", "LOGAN HEIGHTS", "BEAUMONT", "Marshall Rd", and "Chaffr". Highway markers for "478" and "54" are visible. Several icons are overlaid on the map: a blue square with a white 'X' (labeled "BRIDGE ICON"), a blue square with a white 'C' (labeled "CUT ICON"), a red diamond, and a green triangle (labeled "COMPASS ROSE"). A white task list overlay is positioned on the right side of the map. The overlay has a title "Exchange - Create COL Task" and two buttons: "Position Icons" and "Select Icons". The task list contains five steps: Step 1: Click Position Icons; Step 2: Position icons on the map; Step 3: Click Select Icons; Step 4: Select icons to be tracked; Step 5: Repeat steps as needed OR click Return to Exchange when you're done. A "Return to Exchange" button is at the bottom of the overlay. Two orange callout boxes provide additional context: one points to the "Select Icons" button and is labeled "GIFT Wrap overlay UI", and another points to the task list and is labeled "Simple instructions guide the user through each step of the process".

**GIFT Wrap overlay UI**

**Simple instructions guide the user through each step of the process**

Exchange - Create COL Task

Position Icons Select Icons

**Step 1** Click Position Icons

**Step 2** Position icons on the map

**Step 3** Click Select Icons

**Step 4** Select icons to be tracked

**Step 5** Repeat steps as needed  
OR click Return to Exchange when you're done

Return to Exchange

BRIDGE ICON

CUT ICON

COMPASS ROSE

## Conclusion

- Successfully added a new suite of functionality and enhanced many existing features
  - New UI facilitates the rapid and easy development of DKFs that drive RTAs in a guided, step-through fashion
  - Requires no programming skills (e.g., Java programming, XML familiarity) to develop a valid DKF, with associated Condition Classes and Strategies
- Enhanced the blended authoring experience by supporting additional capabilities (i.e., COL, LT) and providing a user-friendly overlay UI, extendible to authoring other map-based assessments



## Recommendations for Future Research

- Near-term R&D
  - Incorporating additional DKF functionality,
    - New Condition Classes (e.g., follow route) and Strategies (e.g., survey assessments), and integration with VBS
  - New features aimed at improving the user experience
  - Investigating the potential VBS RTAs, identifying those most useful to training developers, and prioritizing
- Findings will guide the expansion of GIFT Wrap authoring capabilities that promote an increasingly blended authoring environment

## Recommendations for Future Research

- Extending GIFT into RW environments
  - Authoring in representations of RW spaces
    - GIFT Wrap overlay UI on a RW map
    - Essentially create a new TA, to which all relevant GIFT Wrap functionality could apply
  - RW trainee data inputs using Bluetooth® and other wireless technology driving RTAs
  - Leveraging mobile and AR technology to interface with trainees and provide a mechanism for delivering interventions (e.g., feedback, prompting)



Wifi



# GIFT Wrap Demo

2<sup>nd</sup> Generation Prototype



## Demo Overview

- Land Navigation Use Case
- TA – ARES
- Triggers
  - Concept Assessment & Concept Ended
- Concept Assessment
  - Layout Task – Placing map symbology / icons in the correct location on the map
- Strategy Delivery
  - Feedback

Backup Slides



## Tasks

- Task 7 - Conduct preliminary usability testing
  - Conducted CW with ARL and DI personnel
  - 4 evaluators [ 2 ARL, 2 Team Humanproof ] participated
  - Able to get through most task sequences without a significant amount of prompting from the facilitator
  - A number of important usability issues and potential solutions were uncovered during the testing
  - Findings documented and included in Year-end Report

## Usability Testing Findings (SAMPLE)

| Issue Name   | Description  | Comments / Recommended Solution   |
|--|--|---|
| Create New File  | Task of creating a new Exchange File   | Three out of four participants had no issues with understanding how to create a new Exchange file.  |
| Enter Description; Select TA; Select Scenario            | Functions for entering associated “Exchange File” information  | All participants had no issues with these functions. The functions appeared intuitive.  |
| Copy Icon  | The meaning of the Copy icon was not always clear. It was mistaken for create a new document by one participant.   | Consider replacing current icon with a more commonly used icon for the copy function.   |
| Checkmark Icons  | Participants did not immediately notice the appearance of checkmark icons indicating a step had been complete (e.g., Start Trigger configured). Participants felt additional checkmarks should be used in other places such as on the Learner Task and Strategy pages.                                 | This finding may be in part due to the static nature of the wireframes used to conduct the Cognitive Walkthrough. Participants did start to notice and understand the meaning of the checkmarks once they had been pointed out. Icon placement should be standardized and the use of additional checkmarks should be explored to ensure consistency and better support visibility of the system’s status to the user. |
| Strategy Page – Learner Task Label                       | Participants thought the Learner Task name was editable on this page rather than a static indication of the current Learner Task.  | Change to a label rather than text in a disabled text box. Avoid any feature that indicates to the user that this is editable on the current page.  |
| Tab Orientation - Trigger and Concept Pages              | Participants did not find the stacked orientation and/or expandable/collapsible tabs guided them through the process of configuring the Learner Task and then the Strategy.  | Tabs should be oriented horizontally to better support the user’s flow through the Learner Task and Strategy pages. Recommendation to include some guidance to the user in terms of the next steps within the horizontal layout. This could include providing instruction/ a help overlay on the screen for what is next.   |
| Layout Task and Check On Learning – Map Icon Positioning | There were several issues with the ARES “overlay” controls used to position icons for both the Layout Task and Check On Learning. First, the directions were too text heavy. Second, the participants did not know what the first step of the process was and then what steps remained to complete it. | Modify the UI to include an easy to read and understand, step-by-step guide to positioning and selecting the map icons.   |
| Triggering Task Preview                                  | Participants liked this feature but inquired how they could edit the triggering task if they so desired. They were not sure how to navigate back to the page where the Learner Task was originally created.  | Provide a shortcut back to the page where this Learner Task was created and/or an indication of where it is located. Recommendation to also include instruction on what is being viewed (i.e., the triggering task the user created in an earlier step) to make explicit how the information helps the user.  |
| Help   | Participants indicated the need for some initial training and/or help that could be turned on/off or accessed as needed.   | This could potentially be addressed using an instructional/help overlay (“GIFT for GIFT” as one participant put it) or feature tour for new users.  |