

**DELEGATION IN A CHANGEABLE WORLD:
SUPPORTING PLAYBOOK™ INTERACTIONS FOR UNPREDICTABLE TASKS**

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We have previously advocated a flexible delegation approach to human-automation interaction (Miller and Goldman, 1997; Miller, 2005; Miller, Goldman, Funk and Parasuraman, 2003; Miller and Parasuraman, in press) in a variety of contexts but, most prominently, in the control of unmanned vehicles. Recent studies (e.g., Parasuraman, Galster, Squire, Furukawa, and Miller, 2005) have shown that flexible delegation generally provides users with the ability to make use of varying levels and types of automation support when needed, while maintaining situation awareness and workload levels in keeping with the most favorable, non-flexible automation interaction approaches. SIFT has been pioneering an approach to flexible delegation we call Playook™ since it uses the metaphor of a sports team's "book" of shared plays with short, easily referenced labels as a means of tasking automation. Playbook uses a hierarchical task structure as a template for plays. This hierarchical structure enables operators to command a play via a high level label thereby giving the Playbook's planning automation the responsibility to develop a specific plan which will achieve the play's goals in the current context, yet which remains within the constraints of the play definition. Importantly, Playbook also gives operators the option to drill down in the template's structure (either conceptually, by selecting options as in current interfaces, or literally via a hierarchically structured user interface as is planned for future interfaces) in provide more specific instructions about the method or resources to be used or avoided to accomplishing this instance of the play. Previous Playbook prototypes and demonstrations have largely focused on a priori play calling for static and predictable types of plays: those where plans could be developed and approved before execution and either not revisited during execution or only revisited when extreme divergences from initial planning assumptions would result in plan failure—for example, tasking one or more UVs to maintain surveillance of a fixed area for a stipulated period of time. Recent work, however, has extended Playbook's capabilities to enable the calling of plays which are much less predictable and static—for example, tracking a mobile ground target where it is impossible to know at the time of play calling and plan development how many Uvs will be needed to maintain tracking, where those Uvs will need to go, etc. This novel capability has mandated a substantial revision to our planning approach and has raised a wide variety of human interaction and human interface issues which we are beginning to address. Among these issues are (1) methods for presenting the resource-usage implications of a proposed plan, (2) methods for facilitating the comparison of alternate plans, (3) dynamically and interactively negotiating methods to achieve a play, and (4) methods for defining and managing expectations about the circumstances in which

Playbook will and will not communicate play alterations and ask permission before executing modifications. The full paper will present these issues and will discuss our initial work toward solving them.