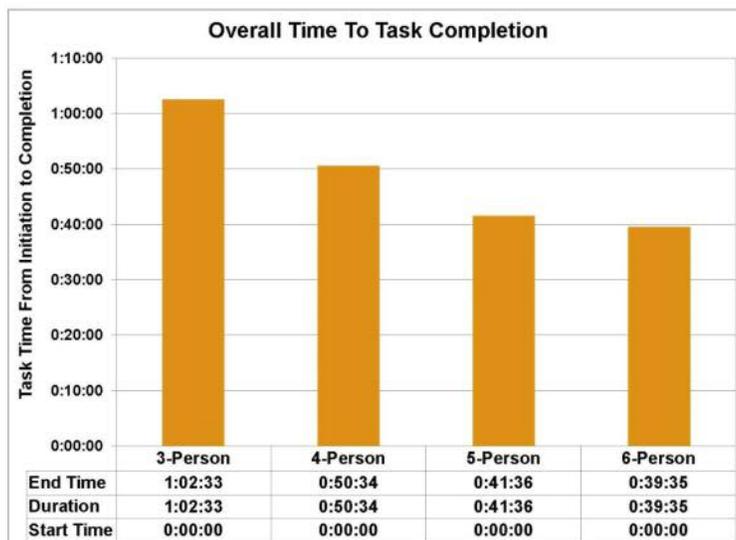


TIME TO TASK COMPLETION

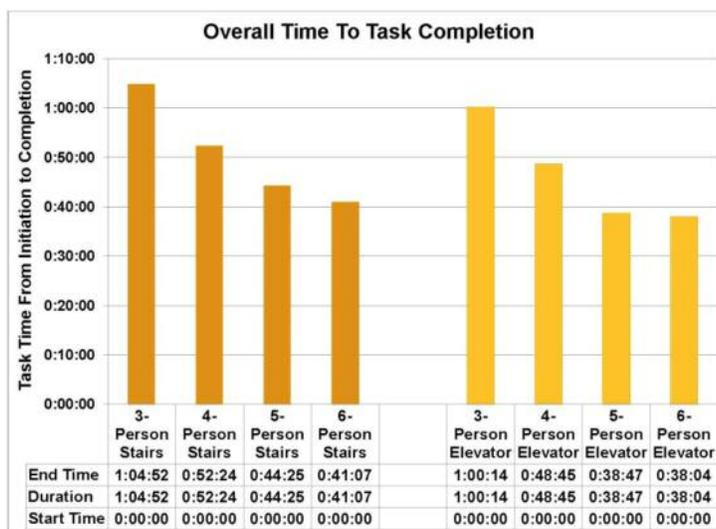
Overall Time-To-Task Completion

Overall scene time is the time that firefighters are actually engaged in tasks on the scene of a structure fire. During the experiments, this time included all operational tasks with the exception of overhaul and salvage. The time to completion of all tasks decreases as crew size increases. On average, 3-person crews took nearly an hour to complete their fire response, while crews of 6 firefighters required a mean time of just under 40 min for completion. The performance of crews sized 4 and 5 were in-between, with crew size 5 taking about 2 min longer than crew size 6, and crew size 4 taking about 9 min longer than crew size 5 but 12 min less than crew size 3. Therefore, the time to complete all task times are substantially reduced for crew size 6 compared to 5, 5 compared to 4, and 4 compared to 3.

The figure to the right presents the overall average times to completion for each crew size tested in the field experiments. As noted previously, the time to completion decreases as crew size increases.



The findings from the crew size analysis suggest that size does matter when it comes to number of firefighters assigned to crews. Even the increment of a single firefighter can have a positive impact on the start, duration and completion of varied critical tasks. Incrementing crew size by two is also beneficial. The most sizeable gains were seen when incrementing from a smaller crew size to a larger crew size, e.g., 3 to 4, 4 to 5, or 3 to 5. The figure to the right presents the average completion times by ascent mode for each crew size. The patterns across crew size are similar by mode. The use of elevators reduced overall completion time relative to ascent by stairs. For any given crew size, the reduction in the time to complete all tasks attributed to ascent mode was roughly in the 3 min to 5 min range in favor of elevators.



Critical Tasks

During the field experiments, a subset of tasks deemed 'critical' in the firefighter high-rise response is examined. Different timing outcomes (begin, duration, end) are important to consider for the subset of tasks. An overview of critical task timings is presented by crew size in the figure below, which shows the overall average start and completion times for each crew size and critical task, including overall completion time. The overall patterns for a given critical task show consistently that the average time to perform a task diminishes as crew size increases.

The obvious exceptions are for Victim (#1 and #2) Rescue and Descent, since the same number of firefighters was carrying the

victim during these tasks regardless of overall crew size. Note the cascading start times by crew size for the early critical tasks — Attack Line, Advance Second Line, Fire Out, Primary Search, and Victim Found. Note also that the time differentials by crew size are very pronounced for both victim rescues. With shorter durations of these critical tasks for larger crew sizes, the net result is seen in the right hand side of the graph — All Task Complete times are substantially reduced for crew size of 6 compared to 5, 5 compared to 4, etc. The greatest improvements in All Task Complete time occurred for time differences between 3-person and 4-person crews and between 4-person and 5-person crews.

