



The Mobile Utility Work Force of the Future

A Rich Consulting Point of View

Prepared By:
Rich Consulting, LLC
January, 2006

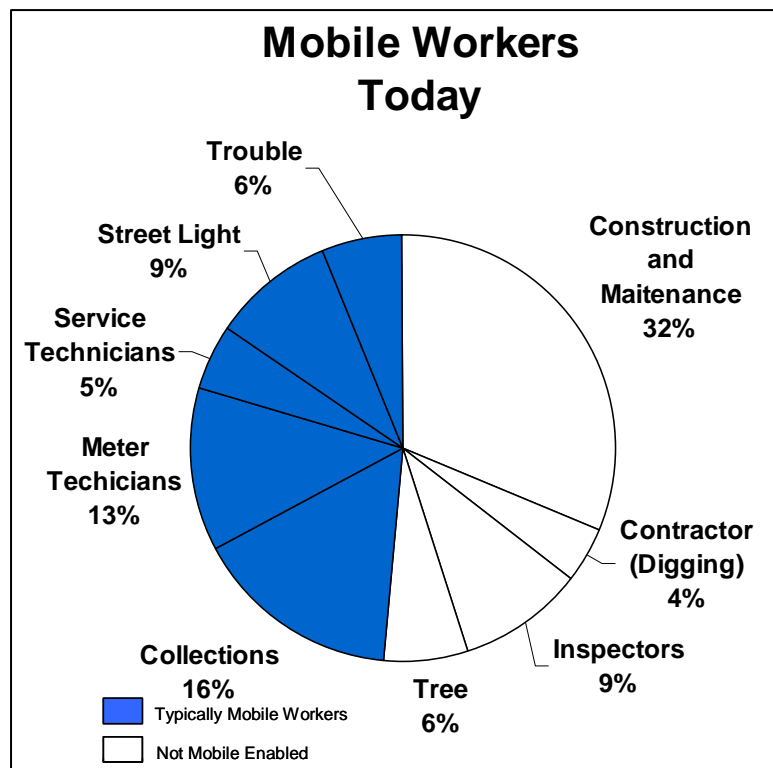
Mobile Utility Workforce of the Future

Utilities are constantly working to improve the productivity of their workforces. Optimization in the assignment of work and deployment of field workers can greatly reduce costs, reduce regulatory pressure, and improve customer service. This Point Of View paper takes a look at the current state of mobile systems deployment and the possible future of the utility industry's mobile workforce.

Today's Mobile Workforce

As shown in the adjacent illustration, about 50% of the typical utility workforce is considered "mobile". These workers possess a data device with some ability for updating information in a two-way communication environment. For the most part, current mobile applications are point solutions, developed to manage a specific family of field work such as *Service Restoration, Street Light Maintenance, Collections, etc.*

While effective in managing the point solution, today's implementations generally do not provide the functionality to perform ancillary activities, such as preparing *Additional Work, Timesheets, Material Requisitions, etc.* Thus, a significant amount of time is still required to fill out paper forms.



Mobile workers are typically assigned a day's work at the beginning of their shift. The status of work assignments is updated over the course of the day, via the mobile device. Supervisors or dispatchers can monitor progress by reviewing the status of the workload within the mobile system. Workers may be assigned additional tasks in real-time, as new work orders are created and routed directly to the field. Frequent updating of work status, in conjunction with the real-time assignment of new work, can result in less down-time and improved field force productivity.

Most mobile workers also operate within the boundaries of specific functional areas or silos (such as *Service Restoration*). Except in emergency or storm conditions, these boundaries are not crossed, even when field workers, from other functional areas, have the ability to perform the work. Each functional area typically has its own dispatchers and supervisors who strive to improve the workflow and optimize the productivity within their particular area. However, this silo focus results in narrowly defined productivity improvement efforts, which will likely reach a point of diminishing returns within a few years.

Continuing the Improvement

Achieving the next level of productivity improvement will require working across multiple functional areas in order to optimize resource allocation at higher level. Reducing the number of work silos and expanding the number of work types, within each functional area, allows the utility to cover the same breadth of work while allowing the utility to more optimally utilize dispatchers, supervisors, and clerical resources that support the field workers. This consolidation of functional areas will create a greater diversity in the knowledge base of the field workers within the area. Developing the knowledge base of this diverse group of field workers allows the utility greater flexibility in assigning work.

A family of mobile and office technologies is now emerging to support the increased demands of wider functional areas and broader worker responsibilities. These new technologies allow utilities to overcome the narrow functional roles and manual methods that have previously been required. New system capabilities such as *Business Intelligence* can automate the matching of worker skills to work requirements. Other capabilities such as *Auto-Assignment* and *Auto-Routing* enable improved 'Worker-to-Supervisor/Dispatcher' ratios. As an additional benefit, the automation of these routine functions enables dispatchers to focus their time on more complex work, where their experience adds the greatest value. Finally, new systems will provide the functionality to automate or streamline many of the ancillary paper-based functions, and further enhance field force productivity.

Crews and Work

Unlike companies within many other industries, utilities are geographically-bound entities. They cover a specific territory and deploy their resources across that territory. They build, inspect, and maintain facilities that are distributed across that territory. Collectively, these facilities form a distribution "machine" that delivers energy to customers. The efficient operation of this "machine" requires that field workers with the required abilities are effectively directed to the work that needs to be performed within the territory. 'Effective direction' involves the matching of key work parameters with key crew parameters.

Parameters of Work

An understanding of the work to be done and the parameters of that work forms the work side of the equation. Parameters of work dictate the priority, or importance, of the work to the goals of the business. The weighting of these parameters allows the comparison and prioritization of the work across work types. The parameters also set the minimum requirements needed to perform the work. Some typical work parameters are shown in the following table.

Typical Work Parameters

Parameter	Description
Safety	<ul style="list-style-type: none"> • Public – The work may have a direct affect on public safety, such as exposed wires or gas leak. • Worker – Worker safety may be a concern for certain types of work. An example would be live electrical work.
Critical to the business	<ul style="list-style-type: none"> • Work may be directly tied to performance-based rates. • The work may affect key performance indicators, or, corporate or departmental goals – that is, stated goals to be achieved by the organization will be affected by the work.
Skills	<ul style="list-style-type: none"> • The type of work may require some specialized skills such as live line high-voltage knowledge or corrosion expertise.
Location within the service territory	<ul style="list-style-type: none"> • The work may be in a remote area, across a major commuting route, or in a heavily loaded area.
Required time to complete	<ul style="list-style-type: none"> • The work may have an expected duration or may be directly integrated with other tasks of the complete work effort.
Cost	<ul style="list-style-type: none"> • The work may have a typical cost to perform. (The cost baseline should be reviewed on a periodic basis, to drive continuous improvement.)
Relation to other work	<ul style="list-style-type: none"> • This specific work may be the only job in an area, or, there may be multiple jobs of different types at the same location.
Impact on customer satisfaction	<ul style="list-style-type: none"> • Customers may have requested the work and expect it to be completed as scheduled.
Cost of Travel	<ul style="list-style-type: none"> • The travel time of any worker to the location may be a cost in labor that must be associated with the work.

Parameters of Crews

The other side of the equation is the field work force. This part of the picture is more complicated since crews are actually a collection of personnel, materials or equipment, and tools. Some typical crew parameters are shown in the following table:

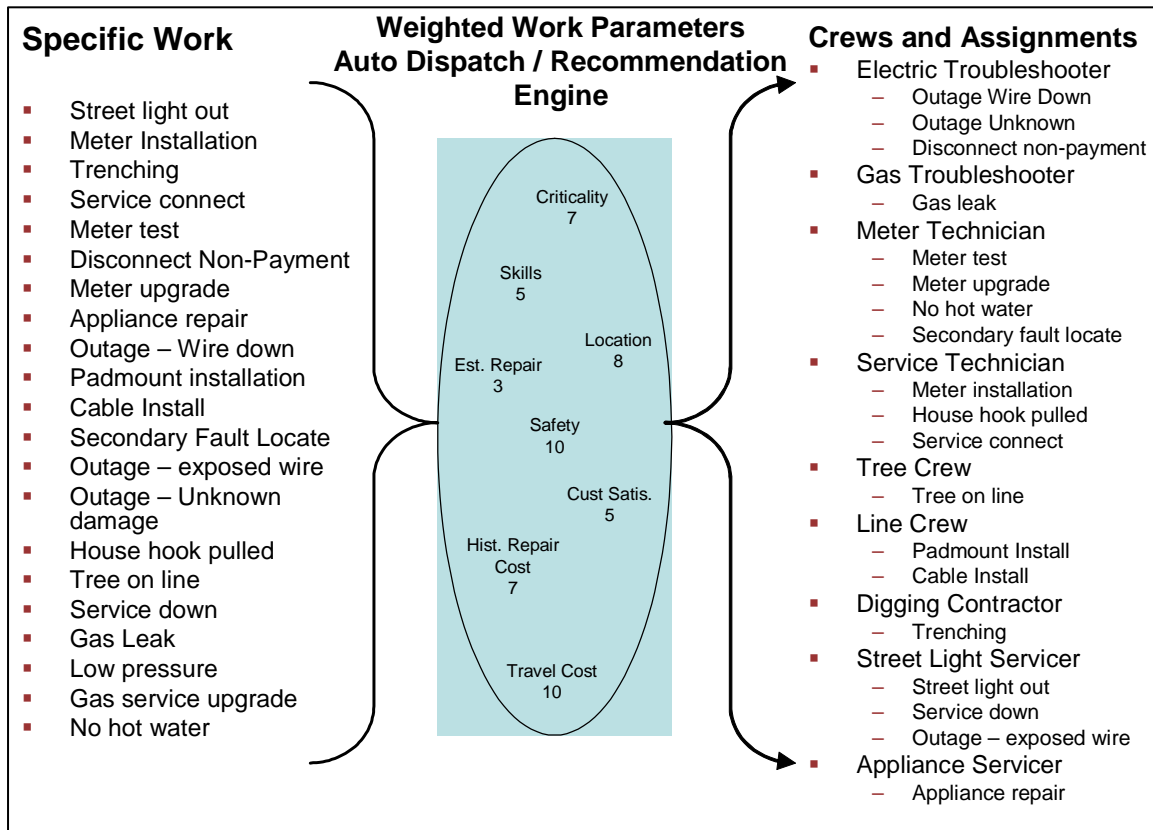
Typical Crew Parameters

Parameter	Description
Personnel Skills	<ul style="list-style-type: none"> The skills of the personnel making up the crew give the crew ability to perform particular work.
Personnel Knowledge	<ul style="list-style-type: none"> The personnel experience within the crew can make the crew more adept at differing types of work.
Personnel Schedules	<ul style="list-style-type: none"> The personnel within a crew have work schedules including time off, vacation, and training time. This has a direct impact on the crew's ability to perform particular work at particular times.
Crew Composition	<ul style="list-style-type: none"> Single or multiple personnel crew
Crew Schedule	<ul style="list-style-type: none"> The crew as an entity is scheduled for particular work shifts - normally in concert with but sometimes in conflict with the personnel schedules of the crew members.
Crew Geographic Coverage	<ul style="list-style-type: none"> Crews are normally assigned primary and backup coverage areas within the utility service territory.
Crew Equipment	<ul style="list-style-type: none"> Crews are outfitted with vehicles and equipment allowing the crew to perform particular work.
Crew Expense	<ul style="list-style-type: none"> The crew will have a particular expense associated with its response to any particular job.

The effective assembly of personnel into crews is an iterative process. The measure of success is the ability to complete any type of work at any location, within a reasonable period of time. In an environment of fewer work silos, crews must have the ability to cover a greater variety of work types. For example, a meter technician who normally installs and tests meters, could also perform secondary level work such as service drops, connects for new customers, service disconnects for non-payment, and so on.

Consolidating Functions

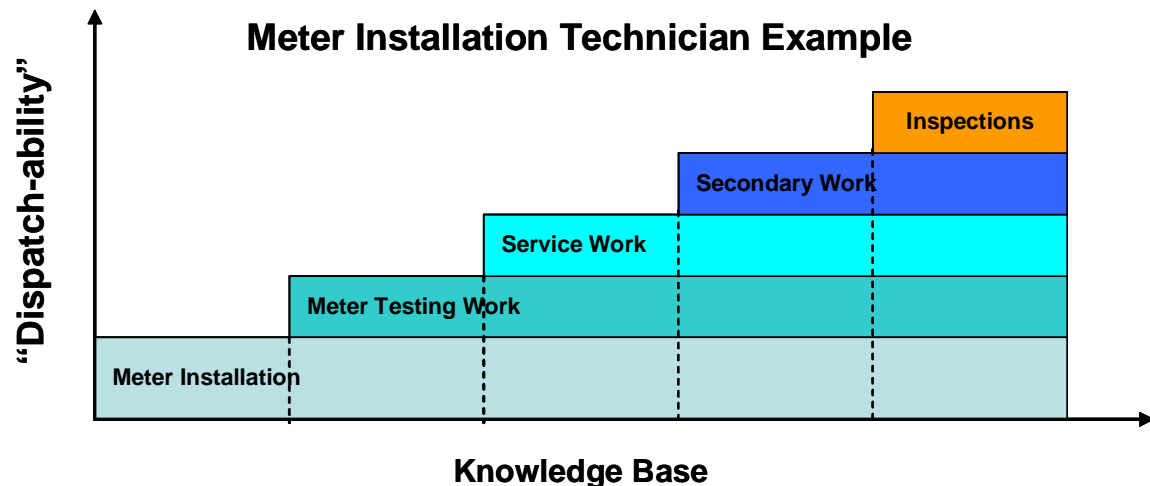
Reducing of the number of work silos will create an environment where field workers with varying knowledge and abilities will be dispatched by the same person. Key to dispatching the correct resource for any particular work will be the balance of work parameters with those of the crew resources available to perform the work. Automatic dispatch will be performed for the majority of work by utilizing system logic for matching the parameters of the work with crew capabilities. Work, not automatically assigned by the system, can then be manually assigned by dispatch personnel.



The work assigned for any given shift will be reviewed automatically at some interval throughout the shift to adjust the workload across the workers to allow completion of the most work possible during the shift. High priority work that emerges during the shift will utilize system recommendation logic to assist the dispatcher with the assignment of the work. GPS enabled mobile devices will allow the central dispatch organization to know where crews are located should the organization wish to switch to a pure geographical dispatch model. Near constant communications with dispatch will allow for the real-time adjustment and replenishment of work and equipment without interrupting the work progression.

Workforce Knowledge Management

One issue enabling the consolidation of work functional areas is the knowledge base of the workers. Increasing the knowledge base of the worker increases the utility's ability to utilize that worker in differing work types. This '*Dispatch-ability*' increases as the worker's knowledge and skill base increases. The following diagram shows an example of a meter installation technician's increasing '*dispatch-ability*' to different work as the technician's knowledge increases.



Each worker will retain some specialization – normally the area where the worker performs the majority of his/her work. However, with additional training and knowledge based technology to assist them, they will be fully qualified to take on a broader range of assignments. Utilities must provide the knowledge transfer mechanism (training environment) for a potentially larger number of single person crews. Technology such as Frequently Asked Questions (FAQs), electronic bulletin boards, or even web logs (blogs) can enable crews to share knowledge within the field worker community. Searchable technology (i.e. Google-like) will open the vast knowledge base of the utility to the field worker. Utilities must also work to protect their investment and retain knowledge workers by defining clear progression opportunities for these highly skilled and valued workers.

Improved Systems

Improved mobile systems, used by the field crews, enable capturing information electronically as it occurs, thereby reducing or eliminating duplication in effort. Geography, asset, knowledge-base, and procedural information within the application will give the field workers access to a large amount of integrated information. This information will allow workers to more quickly locate the work, perform the work, report on the work, and move to the next job. Actual street level estimates of travel will provide more realistic information in the estimation of the total workload duration. Updates during the progression of work, will be used as inputs in continually refining the workload. Asset information can also be updated within the course of work, effectively making field workers part of the asset management solution.

An online workforce will also enable the refinement of scheduling and appointments. Work requiring customer appointments will be taken with consideration of the actual workforce schedule in setting the appointments. In contrast to most appointments today that require morning or afternoon windows, appointments can be taken with ever smaller time windows to improve customer

satisfaction and field resource utilization. This workforce scheduling capability will also improve the scheduling of future work, allowing long-lead forecasts of future overall staff level requirements.

Field Worker Mobile Tools

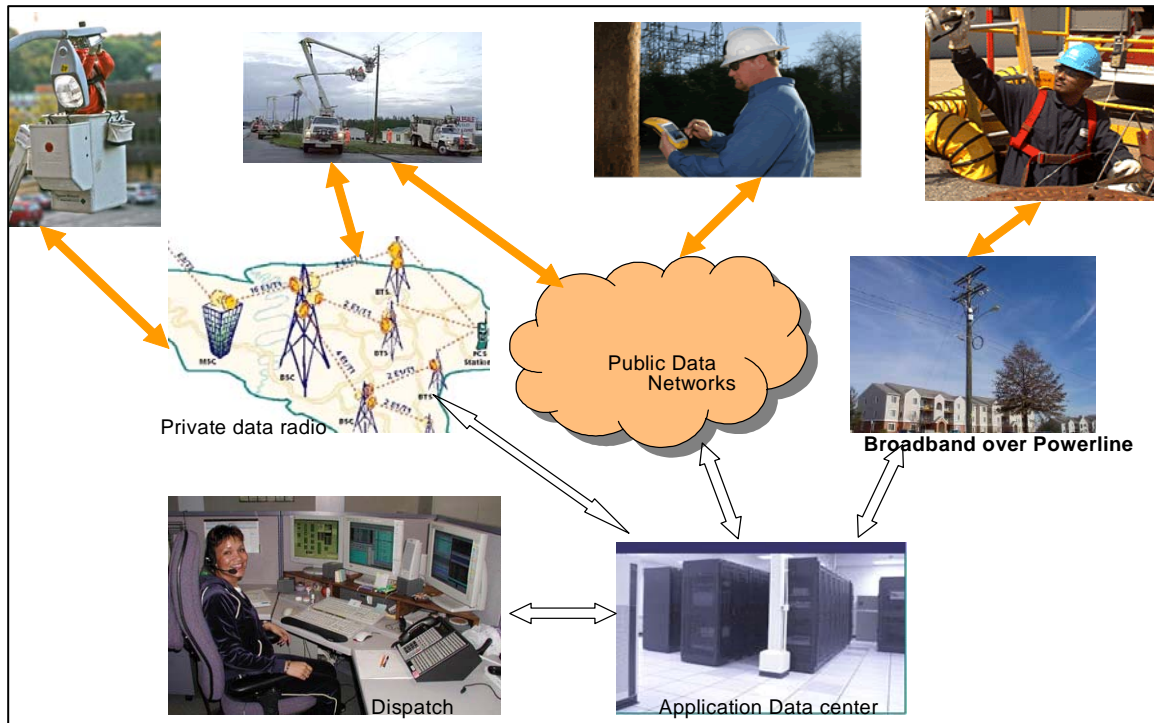
Field workers may use different equipment, depending upon their responsibilities. For those who can complete work with a small GPS enabled device, a cell phone, camera, and/or PDA device may be sufficient (providing this device can display driving directions or maps). For those who work across the entire range of the company geography and facilities, the rugged laptop would be expected to be the norm. With its much larger display and functional ability, this device is better suited to locate, modify, and complete complex work. This worker may also utilize a smaller device capable of docking or communicating with the laptop in situations where it is inappropriate to carry the larger machine. From the software perspective, all software used in the mobile environment is expected to have mapping, GPS, and driving directions ability.

Communications

Communications of field workers with supervisors and dispatchers will be a key necessity and should use the most economical method possible. Most field workers will probably utilize some form of public communication facility due to its relatively low cost (Wireless through hotspots or Wireless through public communication facilities – Cellular Data). Some will utilize dock/undock stations at local facilities. Some will utilize wireless through private data radio networks.

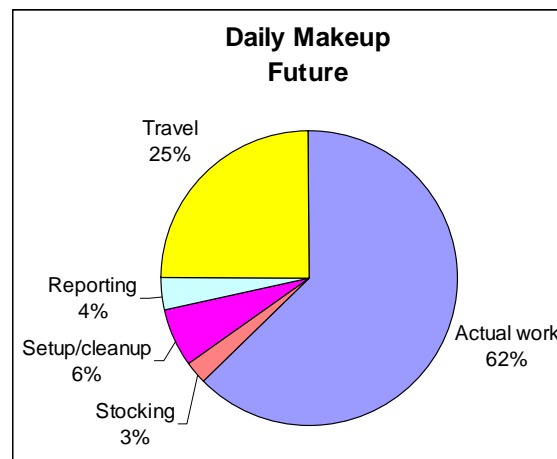
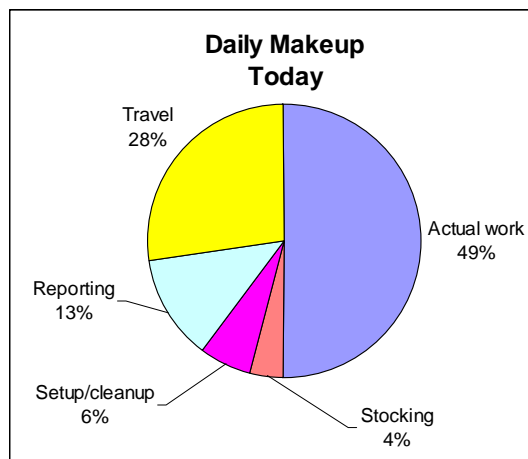
Since public facilities are often not available during storm responses, utilities will need to decide how to establish a communications network in storm recovery efforts. This network may include Broadband over Power Line (BPL), mobile microwave, and/or private data radio. Utilities who are utilizing BPL in a broader network that includes customer service and Automatic Meter Reading (AMR) will be restoring their communications network at the same time as the damaged facilities are being repaired. The following figure illustrates a hypothetical multi-modal communications network from service-center-based personnel to various field operations personnel.

Typical Communications Network



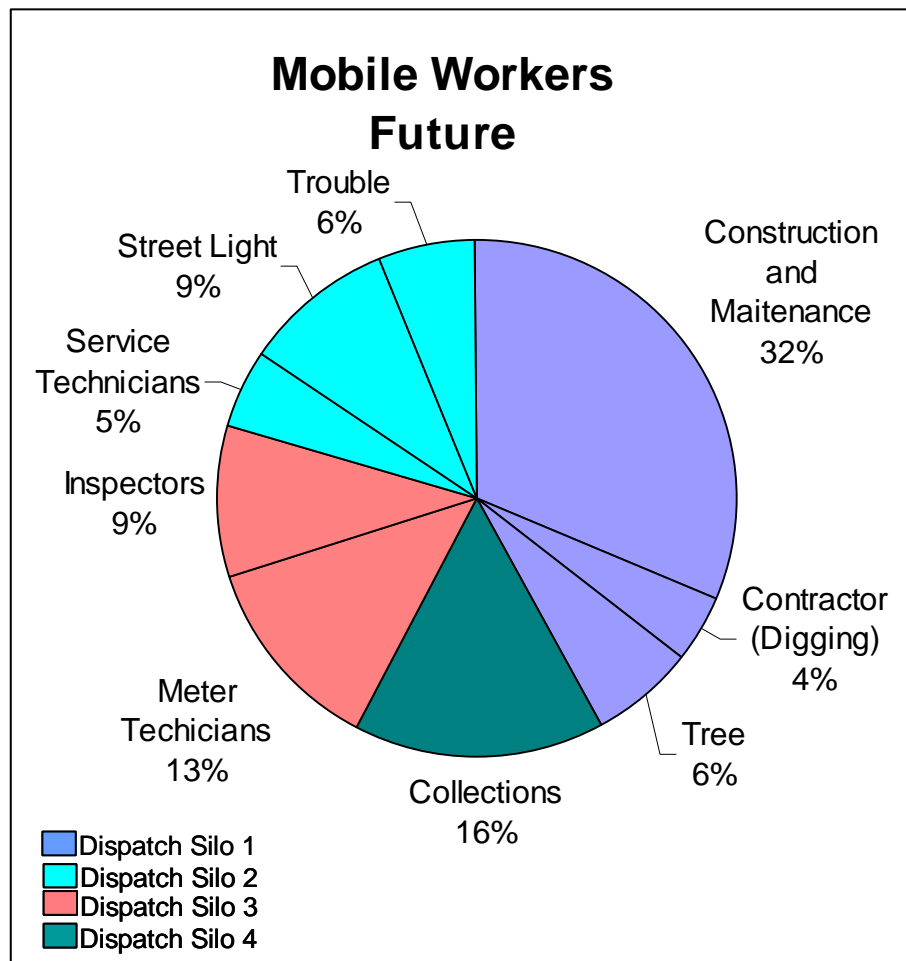
Business Benefit

The major benefit of improving the deployment of work to the field will be the increased amount of actual work performed. Increasing actual work time and reducing lost time will allow the business to reduce the overall cost of work. This will offset any increases in training, worker pay schedules, or the occasional utilization of higher skilled employees on lower skilled work. Making the cost of work and cost of travel integral parts of the work deployment will allow utilities to efficiently manage the more diverse workforce within the broader work category framework. Continually refining the costs with historical performance will iteratively improve the deployment model.



Summary

In order to increase the efficiency of the field workers, utilities must look at “mobilizing” larger segments of the workforce and broadening the scope of work that individuals can perform. The measure of success is to increase the number of work orders completed per day, and reduce the total cost per work order, including travel. The illustration below shows a potential future state, where the full range of field work activities is consolidated into just four work groups or *Dispatch Silos*.



The process of getting to this future state will require:

- A focus on continuous improvement and willingness to test and adapt new system capabilities as they become available.
- The development of all relevant crew and work parameters to enable the best matching of the worker to the work.
- The creation of administrative and dispatch environments consistent with fewer silos.
- The definition and tracking of key productivity and cost metrics – the real measures of success.