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Readiness for improving safe care delivery through web-based hospital nurse scheduling & staffing technology: A multi-hospital approach

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Readiness for improving safe care delivery through web-based hospital nurse scheduling &
staffing technology: A multi-hospital approach

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Presented to the University of San Francisco

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Abstract

Hospital scheduling and staffing practices are linked to patient safety, nurse satisfaction, and cost outcomes (Steege & Rainbow, 2017). Staffing, while complex, is ultimately central to the overall success of the hospital. Demands to eliminate events that cause death or serious harm, produce high patient satisfaction scores while maximizing workforce productivity, test any administrator's skillset. Providing qualified staff in the right place at the right time can be challenged by restrictive union contracts, variable patient acuities, staff attendance, and mandated staffing ratios. These demands may lead to overtime utilization. There is a growing understanding of the negative effects of healthcare worker fatigue on patient outcomes (IOM, 2004; Stimpfel & Aiken, 2013). The impending nursing shortage has the potential to exacerbate the problem of high quality care delivery and could lead to devastating impacts to the profession as well as patients. Though Kaiser Permanente (KP) is generally known for being a healthcare trailblazer, staffing technology was lagging. The purpose of this project is to prepare KP nursing for transformative change with web-based hospital scheduling and staffing. This work addresses the readiness for deployment across the KP system. Complexity and change theories frame this project. Hospital staffing epitomizes complexity. This planned change provides a road map for other nurse leaders to navigate the lessons learned. Satisfaction surveys from 222 nursing staff receiving training in the new technology reveal a favorable intent for technology adoption. Future work will focus on the impact realization of nurse-sensitive outcome indicators and registered nurse overtime.

Key Words: *Scheduling, Staffing, Roster, Web-based Technology, Safety, Fatigue, Satisfaction*

Introduction

The effects of staffing practices impact nearly every aspect of the care delivery system and are associated with hospital efficiency, safe care delivery, workforce retention, and financial performance (Douglas, 2009). The fundamental domain of “staffing” includes the act of appropriately matching patient needs with care givers holding the appropriate skill set delivered to the right location, at the right time.

Excellence in staffing is a dynamic, evidence-driven process that results in the efficient, effective use of qualified staff and the stewardship of resources to achieve the best possible outcomes for patients, their families, the workforce, and the organization in which care is delivered. (Douglas, 2008, p.3).

Advances in the area of hospital staffing have been slow to be realized and poorly adopted, leaving behind the possible benefits of data collection, business intelligence tools, and evidence-based knowledge on staffing strategies, budgets, and practices. Technology allows us to collect large volumes of data that has historically been captured on paper and then sent to a recycling bin or file cabinet. Kerfoot (2015) noted that it is virtually impossible to transition healthcare staffing from opinion-based practices of the past to data-driven models of the future without the use of technology. As an example, a simple schedule of 21 nurses working in a single nursing unit over a month, each nurse working 20 days, produces approximately 1.6 million schedule iterations (Eastaugh, 2012). The sheer volume of possibilities makes manual processing inefficient at best. Recent technological advancements provide an opportunity for hospitals to manage the complexity of scheduling and staffing practices. Administrators must lead the way through ever changing reimbursement models, work to improve patient satisfaction indicators, affect hospital quality metrics, and close the labor shortage gap during a time of

political unknowns of healthcare reform. The demand for care, coupled with comorbidities of an aging population, and a diminishing supply as baby-boom nurses retire, has led to stress on healthcare systems across the nation. By the end of January 2016, the volume of open health care jobs outflanked hires by approximately 500,000 (Faller & Gogek, 2016). The average age of the registered nurse is 50 years or greater (American Association of Colleges of Nursing [AACN], 2017). Estimates of a pending nurse shortage continue, and range between 300,000 to 1 million (Juraschek, Zhang, Ranganathan, & Lin, 2012). The Bureau of Labor Statistics (2015) has projected the need for over 600,000 replacement nurses by 2024 with an estimated nursing vacancy rate of 1.09 million.

The National Academies of Medicine, formerly the Institute of Medicine (IOM), issued an awakening call that resonated in a report that revealed staggering numbers of up to 98,000 annual patient deaths in the US are due to medical errors (IOM, 2000). This report was followed by a series of publications under the same commission that underscored the importance of nurses' work environment having a direct impact on patient safety. As principle caregivers to hospitalized patients, nurses are inevitably linked to patient safety (IOM, 2011). This commission concluded that there was an "unavailability, incompleteness, and unreliability of nurse staffing data in the United States and a weakness of tools for measuring nursing workload and predicting hospital staffing needs" (IOM, 2004, p. 180). A large part of this shortfall resides in the general use of manual processes that do not allow for data collection and thus analysis. Mensik and Nickitas (2015) called on hospital administrators to use electronic staffing and scheduling systems that assist in matching patient needs with provider skillsets. They concluded that this transition is essential to impact staffing-related injuries and deaths.

As healthcare experiences a supply-demand misalignment, hospital administrators may look to additional hours beyond the scheduled shift or add extra shifts in the nurse's work week to close the gap. Many of these extra shifts may result in excessive hours in the work week driving overtime pay distribution. Technology may aid healthcare leaders in managing this complexity.

The 21 not-for-profit acute care hospitals of Kaiser Permanente (KP) Northern California (NCAL) provide care for approximately 2,700 admitted patients on any given day. The organization's mission is to provide affordable high quality care for its communities and members served. This is operationalized through the three synergistic arms of the organization: the Permanente Medical group of providers, the insurance plan, and the hospital structure. The organization is known for being a healthcare innovator. This stems from its shipyard roots of offering preventative health coverage during the World War II era (Kaiser Permanente, 2017). The organization was the national leader in embracing the electronic health record (EHR); it was visionary in building the Sidney R. Garfield Healthcare Innovation Center where technology, space, and workflows come together to transform care delivery. The geographic footprint of the KP NCAL region spans from Santa Rosa to Fresno, covering over 200 miles as depicted in Appendix A.

Problem Description

With a background understanding of the impact of staffing on nurse satisfaction, care outcomes, and cost, this project focuses on the readiness of technology acceptance in the deployment of a web-based staffing and scheduling solution. The KLAS research report (Egbert & Paxman, 2016) points to features such as self-service, mobility, predictive analytics, and acuity tools in overall scoring of new staffing technology products. KP has not kept pace with

leading industry practices or technological advances in this space. The result has yielded inefficiency, high cost, and risk to the organization and its employees when compared to national standards. The NCAL region is under hired and is carrying nearly double the rate of registered nurse (RN) overtime when compared to national benchmarks. The legacy system does not accept data file feeds, requiring data input into the system by manual keyed entry. The lack of system interoperability between human resources (HR) and time and attendance (TIME) systems lends itself to human error from manual data entry. Shadow systems of duplicative HR information such as work shift and FTE reside in the application. These shadow systems often conflict with the HR systems of record. The resulting impact is that the employee is either not working to their full obligation or their benefit distribution is not being accurately prorated. Data exports from the current staffing system are delivered in text file format, requiring further manipulation for any meaningful analysis. Each medical center has experienced drift in standard staffing practices. This has resulted in inconsistent interpretation and enforcement of union contracts, union grievances, and added labor costs. All available scheduling codes within the staffing system have been utilized, challenging the organization to keep up pace with pay practices within California's complex and changing labor laws. The current scheduling and staffing system has been in use for over three decades and operates on the antiquated technology of disk operating system (DOS).

KP has a history of resistance between the corporate union representing the professional nursing staff partnering together on new initiatives. This has resulted in slow adoption to change across the organization, especially when represented staff are affected. As an example, documents outlining the need for change to both the staffing and patient classification systems can be found dating back more than a decade. KP Schedule, a web-based scheduling and

staffing system, when fully deployed across KP will affect 20,000 employees in NCAL, of which approximately 12,000 are nurses. The deployment timeline begins during a bargaining year between KP and the nursing union. This contributes another layer of complexity to the problem at hand.

The McKesson legacy system, ANSOS OneStaff[®], operates off of individual hospital platforms and as such, the medical centers view of employees worked hours is limited to the home hospital. This restricted view may contribute to overtime if an employee elects to pick up additional shifts in an adjacent hospital within the system. Users of the legacy technology have identified shortcomings including the following: a) lack of transparency, b) system limitations such as an exhaustive use of all available scheduling codes, c) manual processes of keyed data entry, and d) variation across medical centers. See Appendix B.

Internal data has revealed that RN non-holiday overtime rates are nearly two times the industry standard (Labor Management Institute [LMI], 2016). A generally accepted overtime benchmark is 5% of productive hours (LMI, 2016). KP is experiencing an average RN overtime rate of 9% of productive hours. The overarching project has identified RN overtime as a proxy measure of nurse fatigue. This proxy is based off of seminal work commissioned for American Nurses Association (Avalere Health LLC, 2015) which called for restrictions in mandatory overtime. The literature indicates that the impact of fatigue on care delivery may result in a three-fold increase of medical errors (Ellis, 2008) with a demonstrable inverse relationship between extended shift length or work hours in the week and patient outcome (Clendon & Gibbons, 2015; Stimpfel, Sloane, & Aiken, 2012; Martsolf et al., 2014). Also noted is the impact of prolonged work hours on increased occupational injury rates (de Castro et al., 2010). Nurse satisfaction has been shown to be negatively affected with excessive work hours

(Leineweber et al., 2016; Saber, 2013; Stimpfel & Aiken, 2013). Collectively, these factors present a compelling case for change. The solution of deploying a web-based scheduling and staffing technology is intended address patient safety, organizational cost, and employee satisfaction. While client server-based systems provide more control of both the software and the data, web-based solutions are seen as more agile, saving time and cost. KP ultimately elected to retain the benefits of both by internally hosting the web platform on its cloud-based servers. Lewin's change management framework provides a foundation for change and assists in unfreezing the current state (see Appendix C). Organizational learning from prior technology deployment and adoption by end-users was sought to inform the change process. The most relevant learnings for a system-wide solution deployment of this magnitude involved the EHR roll out nearly a decade ago therefore a considerable amount of work may be required to facilitate change.

Available Knowledge

A review of available evidence was conducted within the following databases: CINAHL, Cochrane Library, Pubmed, ABI/INFORM with the key words: *fatigue, staffing, technology acceptance, and nurs**. The search was limited to peer reviewed articles published in English between the years 2005-2017. The initial search yielded 797 results. Articles considered for inclusion reported on quality and safety aspects of nurse staffing, cost outcomes, and technology acceptance of hospital nursing staff. A review of abstracts eliminated articles based on staffing ratios and overall working conditions. Twenty articles were selected based on relevance. The John's Hopkins Nursing Evidence-Based Practice (JHNEBP) and the JHNEBP Non-Research Evidence Appraisal Tools (Johns Hopkins Hospital/The Johns Hopkins University, 2012) were utilized to critically appraise the level and strength of studies in this search. Five of the studies

included are quasi-experimental in design as they lacked random assignment and were used to evaluate causal impact of an intervention on a target population. The remaining nine observational studies had a non-experimental design; six were categorized as non-research articles. Overall strength ratings on the JHNEBP Research Evidence Appraisal Tool and the JHNEBP Non-Research Evidence Appraisal Tool ranged from a level II –V and quality ratings mainly carried a good, or “B” rating. Limited sample size and the inability to address confounding variables were frequently noted as study limitations. With the underpinnings of nurse fatigue as a contributor to patient harm, technology in nursing was explored to understand its impact on staffing effectiveness, workforce flexibility, and adoption of use.

Thematic review. A review of articles retrieved supports three overarching themes surrounding the use of technology for hospital scheduling and staffing. 1) fatigue results from excessive shift length or hours worked in the week and plays a significant role in patient outcomes and staff wellbeing (Ellis, 2008; Lobo, Fisher, Peachey, Ploeg, & Akhtar-Danesh, 2014; Stimpfel & Aiken, 2013; Trinkoff et al., 2011). 2) technology provides superior accuracy and efficiency than traditional human processes (Adams, Kaplow, Dominy, & Stroud, 2015; Drake, 2013; Leineweber, et al., 2016; Maenhout & Vanhoucke, 2013; Wright & Bretthauer, 2010; Wright & Mahar, 2013). Technological benefits become more important when looking at opportunities of scale across a system of multiple hospitals. 3) the intended benefits of a new solution can only be realized if end-users accept and use the new technology (deVeer, et al., 2011; Hansen et al., 2015; Kaye, 2017; Kerr & Timony, 2009; Putzer & Park, 2010; Strudwick, 2015). These themes are presented in the synthesis table (see Appendix D).

Fatigue. Overtime, by definition, is work in excess of the scheduled hours, work hours beyond 40 hours in a week, or work in multiple consecutive days. Multiple publications have

documented quality and safety risks associated with extended shift length or worked hours (Ellis, 2008; Institute of Medicine [IOM], 2004; Lobo, Fisher, Peachey, Ploeg, & Akhtar-Danesh, 2014; Martsof et al., 2014; Stimpfel & Aiken, 2013; Trinkoff et al., 2011). Overtime, therefore, has been identified as a proxy measure for fatigue. Ellis (2008) revealed that only a fraction of scheduled eight-hour shifts were actually completed as planned; the vast majority of scheduled shifts exceeded the intended length. These findings were not isolated, and occurred on a routine basis. Recommendations for nurses and employers of nurses were provided after a systematic review of literature from the nursing profession as well as industries outside of healthcare. Resulting recommendations included were nurse self-monitoring, employer imposed environmental changes, and policy changes to limit extended work hours and consecutive days of work. Also, noted in the report, was the necessity to plan for adequate numbers of nurses with utilization of flexible hours by part time and partial shift allocation employees.

Trinkoff et al. (2011) conducted a non-experimental cross-sectional survey of 633 nurses in North Carolina and Illinois. Work schedule was found to be related to mortality when controlling for staffing levels and hospital characteristics. Significant findings were reported in deaths from pneumonia in hospitals where nurses had long work hours and lack of recovery time away from work. Death from abdominal aortic aneurysm and congestive heart failure increased when nurses worked while ill. The most significant finding was the correlation between the lack of recovery time from work and all causes of death. Recommendations from this work focused on improving work schedules as well as offering alternatives to 12 hour shifts and enforcing break utilization.

Stimpfel and Aiken, (2013) conducted a non-experimental secondary analysis of a multi-state survey linking hospital administrative data and a voluntary survey of more than 22,000

registered nurses. Nurses reported on their shift duration, satisfaction with work schedule, and their assessment of the overall care delivery quality. The most common shift length reported was 12 to 13 hours. Despite nurses stating satisfaction with longer than eight-hour shift lengths, results indicated statistically significant correlations in inadequate quality of care perceptions with shifts greater than 12 hours and safety concerns when shift lengths ranged from 12 to 13 hours. Beyond 13 hours the results degraded further.

Martin (2015) conducted a non-experimental survey (n=9) to assess nurse fatigue and shift length. Fatigue was measured using the occupational fatigue exhaustion/recovery scale (OFER) and shift length. Volunteers had shift lengths altered from 12 hours to eight hours for four weeks. While sleep increased on average 22 minutes per day on the eight-hour shift, work hours also increased an average of 51 minutes per week. The small sample size was a limitation of this work that limits its power.

Clendon and Gibbons (2015) performed a systematic review of literature around nursing shift length and errors in nursing care delivery. Errors included self-reported mistakes, incomplete care delivery, and adverse quality outcomes. Interventions were categorized by Benner's taxonomy of error. The review was based on the Joanna Briggs Institute process and included 5,429 publications of which 13 studies were deemed to have high enough quality. Six of the studies reported a significant number of nursing errors for nurses working shifts more than 12 hours; three studies reported no difference based on shift length. Four of the studies revealed an increased error rates with shifts up to eight hours. This work suggests a link between 12 hour shifts and an increased risk for error. The authors recommended that hospital administrators review scheduled shift lengths and consider changing shifts to eight or ten hours. When limiting the shift length is not possible, the authors went on to recommend providing schedule pattern

breaks to maximize recovery time away from work. Limitations to this work included a broad definition of error rates. Confounding factors such as fatigue, stress levels, hand-off processes, skill mix, and scheduling practices were not addressed in this work.

While shift length and adequacy of resources have been key findings of numerous studies, Yankovsky, Gajewski and Dunton (2016) reported that nursing efficiency and quality care can coexist. In a non-experimental study using the national database of nursing quality indicators (NDNQI) from 1,217 hospitals across 19 quarters (2007-2011), a population of 7,355 was included. Hours per patient day (HPPD), fall rate, and pressure ulcer rates were assessed in adult service lines using data envelopment analysis (DEA), a non-parametric method to measure operations efficiency. Over the length of time of this study, RN staffing increased and licensed practical nurse (LPN) staffing decreased, resulting in overall greater efficiencies with more RN and fewer LPN care hours; nurse-sensitive indicators of patient falls and pressure ulcers decreased. The researchers concluded that DEA is an improvement over traditional efficiency metrics. Because the large data set may over represent large hospitals, the findings were not generalizable.

Technology and mathematical underpinnings in staffing. Fundamentally, informatics is a science that utilizes computers to process information ("Informatics," 2016). Information technology (IT) provides a venue for data collection and the tools to house and aid in the necessary analyses for effective decision-making (Kaminski, 2015). At its best, there is an overlap within the disciplines of information systems, IT, computer science, and statistics. Within healthcare environments, the goal of health IT is to leverage computers to improve care delivery. These improvements may manifest themselves by improved patient outcomes, added safety measures, and/or improved efficiencies. Two studies (Drake, 2013; Maenhout &

Vanhoucke, 2013) focused on the use of technology and mathematical modeling to assess the efficiency and the effectiveness of compliance to hospital staffing policies. This area of investigation is important as hospital labor costs often represent over 50% of the operating budget (Schouten, 2013). Efficient utilization of nursing resources is an essential aspect of hospital operations management.

In a quasi-experimental study, Maenhout and Vanhoucke (2013) examined the effects of scheduling policy changes on a.) schedule quality, b.) schedule efficiency, c.) schedule effectiveness and d.) nurse satisfaction. Data were collected on nurses employed in three wards of a not for profit university hospital in Belgium. The variables included nurse wage costs, full-time equivalent mix, shift length, shift start times, nurse competencies, staff schedule preferences, unit coverage requirements, and shift scheduling policies. A computerized scheduling problem generator was used to test staffing and scheduling scenarios of cross unit utilization, minimum work stretch, and part-time versus full-time workforce mix. While the sample size was small (n= 80), study findings concluded that staffing and scheduling multiple nursing units simultaneously maintained quality care delivery while leading to improvements in cost expenditure, and staff satisfaction. Limitations of this work include a limited sample size which may not yield results generalizable beyond the population studied.

Drake (2013) performed a three-year longitudinal study to understand the effects of implementation of an electronic nurse rostering (scheduling) system over 42 roster periods across 15 nursing wards. The study was completed in an 800-bed private hospital in Malaysia. Linear regression analysis was used to understand effects of the independent variable of technology on the dependent variable of schedule rule integrity. The following scenarios were analyzed: a) number of staff requests to scheduling rule compliance, b) number of shifts assigned using the

electronic system to number of scheduling rules broken, c) number of shifts assigned manually to number of scheduling rules broken, and d) number of schedule changes made after schedule approval to number of scheduling rules broken. Findings revealed that the use of the electronic rostering system had less scheduling rules broken. It also revealed that nearly half of the nurse managers continued to manually roster staff. One hypothesis for this continued manual practice was that the tool did not differentiate between the significance of the rules. In other words, nurse managers may have chosen to manually roster to discount rules they deemed as unimportant. The author noted a limitation of this study included the use of Microsoft Excel as the statistical analysis tool. Attrition in the units over the three years may also have played a contributing role to an underestimate of the relationship between variables. This research indicated a need for further data collection from other facilities before results could be generalizable.

Wright and Bretthauer (2010) conducted a quasi-experimental study based on a structural flexibility framework. They studied staffing models, resulting labor costs, and nurse satisfaction across three nursing units in a 526-bed non-profit hospital in the mid-western United States (US). Using CPLEX schedule optimizing software and algorithmic formulas, an analysis of increased demand was assessed against: a) myopic or closed unit-based staffing, b) use of an internal float pool, and c) use of externally supplied agency registered nurses (RNs). Comparatively, the internal float pool strategy yielded a 16.3% lower cost than use of agency RNs and fewer undesirable shifts as reported by unit based nurses. The use of agency RNs showed a reduction in staff overtime at an overall labor cost over the myopic model by 0.7%. Implications are that technology can assist in meeting the supply-demand mismatch while mitigating overtime utilization and enhancing schedule desirability thus reducing nurse attrition. Limitations of this

study include a lack of statistical rigor as results were reported as a general percentage improvement in overall cost. The authors offered the need for additional study to further the body of knowledge in flexible hospital nursing workforce utilization.

Maenhout and Vanhoucke (2013), Wright and Bretthauer (2010), and Wright and Mahar (2013) all utilized simulated problem instance simulation generators and not actual operational work schedules. This is notable as the number of confounding variables of daily staffing decisions include the complexities of hospital policies, the application of contract language for multiple unions, federal and state regulations, a variability within the work force, changing hospital census, and patient acuity.

Expanding upon earlier work, Wright and Mahar (2013) performed a quasi-experimental study of centralized versus decentralized nurse scheduling in two non-profit hospitals of 247 and 526 bed capacities in the mid-western US. Five hundred and twenty-two data instances were analyzed over a 90-day time frame using linear analysis to study the dependent variables of cost and schedule preference to an independent variable of centralized scheduling. CPLEX optimizer software was utilized. As in the prior work, results were only reported as a general percentage improvement to the control group and revealed an average improvement of 10.7% in labor costs, reduction of overtime expense by 80% and reduction of undesirable shifts by 34%. Confounding constraints of consecutive shifts and consecutive days off were not addressed in this study.

Adams, Kaplow, Dominy, and Stroud (2015) conducted an organizational non-research quality improvement project evaluating the efficacy of an internal float pool across six hospitals and one clinic in the Atlanta, Georgia area. The goal of this project was to provide an additional 7,200 hours of coverage per quarter and thereby reducing reliance on external contingent

workforce. The findings were favorable in meeting and exceeding the intended targets and reducing agency hours by 70% of baseline. Additionally, cost savings were realized by decreasing overtime by 5,322 hours as well as an overall reduction on orientation time.

Leineweber, et al (2016) performed a non-experimental survey of 23,076 RNs in 384 hospitals spanning 10 European countries. The survey looked at nurse practice environment using the PES-NWI-R tool, schedule flexibility, and intention to leave the workplace and/or the profession of nursing. Findings revealed that the intention to leave the profession was largely dependent on individual factors such as age and years of service while intention to leave the workplace was largely dependent on work environment, such as impact on staffing and resource allocation, nursing inclusion in hospital affairs, and nurse-physician relationships. Significant in the intent to leave the work place was also the effect of overall work schedule flexibility. A higher proportion of nurses who were satisfied with their work schedule flexibility had lower odds of leaving their work unit. This work assists in the understanding the multiple inputs, including the work schedule, on the intent to leave the job or the profession.

The above studies, in aggregate, support technology applied modeling to accurately identify the most effective utilization of resources within and between multiple hospitals. Use of scheduling and staffing technology may enhance nurse satisfaction, improve efficiencies and favorably impact labor costs (Adams et al., 2015; Drake, 2013; Maenhout & Vanhoucke, 2013; Wright & Bretthauer, 2010; Wright & Mahar, 2013). Little evidence was found regarding the general acceptance or the effects specific to web-based staffing technology across hospital systems.

Technology acceptance. The legislative imperative for hospitals to embrace electronic medical records (Office for Civil Rights [OCR], 2013) has provided hospitals and health care

systems access to large data sets that were not previously available. About one third of the more than 5,000 hospitals in the United States have automated staffing and scheduling systems (Crist-Grundman & Mulrooney, 2011). The use of technology as a tool in hospital staffing and scheduling provides the benefits of agility, speed, and accuracy superior to human computational analyses. Technology, when utilized, may assist by assessing staff characteristics such as work pattern, time off requests, patient census, and staff availability. Appropriate allocation of staffing is fundamental; a greater understanding what influences the success of new technology deployment becomes critical to the use of such technology (deVeer, Fleuren, Bekkema, & Francke, 2011).

Kerr and Timony (2009), in a non-experimental exploratory survey at a 600-bed teaching hospital in Dublin, Ireland, reviewed staff experience in rostering, identification of the most important aspects of rostering, and the overall benefits of the roster. The response rate (n=50) of the nurse managers, bedside RNs, and clerical staff participants was 80%. The survey was conducted through zoomerang[®]. Thematic analysis was performed; statistical analysis of data was not reported. Findings revealed that rostering is a complex process; the majority of participants (85%) would choose electronic systems over paper-based systems.

Putzer and Park (2010) conducted a non-experimental survey of RNs from two community hospitals in the Southeastern US. The study assessed the dependent framework variables of technology acceptance model (TAM) and diffusion of innovations (DOI) to assess attitude toward smartphone use in the hospital work setting. There was no relationship demonstrated between the behavioral intention to use a device and actual smartphone use, however observability of use, compatibility with healthcare technology, and relevance to job were each identified as significant indicators of smartphone adoption. This study provides an

understanding of innovation characteristics, in this case versatility, portability, and relevance to the work setting, when understanding technology adoption that may be applied to the field of staffing. Limitations of the study included a response rate of 40% which yielded a relatively small sample size. The geographic area was also limited.

DeVeer, et al. (2011) conducted a non-experimental survey of nurses and nursing assistants (n=1,018) in the Netherlands. The survey, yielding a 67% response rate, focused on experiences with newly introduced technology. Nearly half of respondents had exposure to new technology over the prior three years and rated the introduction of new technology as good or very good. Findings revealed that when nursing staff had a perceived ease of use or that the technology was beneficial to the patient, uptake was enhanced. Training and coaching was noted to be the primary factor associated with successful deployment. IT support or a help desk enhanced the perceived ease of use. This article provided insight into nursing perceptions of technology including the importance of training. It further supports prior publications that have identified determinants of technology acceptance such as usability, reliability, and utility.

Hansen et al. (2015) conducted a pre/post survey using a quasi-experimental research design to assess job satisfaction, social climate, and working hours after implementation of a self-rostering technology across three distinct employee groups (n= 1,070). Two of the three groups studied included staff represented by organized labor. Data related to job demands and general job satisfaction was collected using the Copenhagen Psychosocial Questionnaire. Social climate was assessed using the Negative Acts Questionnaire. Social support from colleagues' post intervention increased significantly when compared to the reference group. The overall response rate was 64%. The sample was of significant size; findings were adjusted for age and gender. Limitations included non-randomization of the population studied.

Kaye (2017) conducted a review of literature for nurses' perception of new technologies specific to barcode medication administration, EHR, and nursing clinical decision support acceptance. The search yielded 496 results of which 14 were found to meet the inclusion criteria. Principal determinants to acceptance of new technology was peer support and perceived ease of use. Altered workflows that impacted job efficiency was the primary barrier to technology acceptance. Age was also noted to have a negative correlation to acceptance in five of the studies. Limitations included a lack of peer-review process for half of the studies as well as the limited number of studies and small sample size of some of the studies.

Strudwick (2015) performed a literature review for nurses' predictive use of healthcare technology. The review included 20 studies with significant relevance to understand technology acceptance. The result revealed that a modified TAM best explains nurses' acceptance which includes the following variables: perceived ease of use, perceived usefulness, perceived impact on patient safety, facilitating conditions that remove barriers, individual personality traits such as optimism, computer anxiety, job relevance, social influence, and experience in the nursing role. This work is relevant in understanding the nurses' complex work environment and end-user characteristics when deploying new technology.

The "sharing economy" is a social, economic, transactional system that links consumers with providers via the internet and smart devices ("Sharing economy," 2017). Estimates of contingent workers in 2015 was reported at 44 million in the US, representative of 29% of all workers (Gregoire & Thiyagrajan, 2016). The ability to have visibility of need with resources facilitates an Uber[®]-like workforce flexibility (Rosenblat, 2016). Efficient utilization of the part-time and contingent (temporary and on-call) workforce may ultimately decrease the reliance of excessive work hours from permanent staff and thus influence safe care delivery through fatigue

mitigation. The literature would suggest that current hospital scheduling processes are not sustainable, and ripe for innovative change. Healthcare staffing is an \$11.1 billion industry in the United States with 7% niche growth rates in 2016 (Harris Williams & Co., 2015). Overall advancements in technology, coupled with the market need for additional workforce, makes the healthcare industry favorable in the life cycle for innovation.

Nursing staff are a significant portion of the hospital workforce, it is therefore important to understand their perceptions of new technology. Acceptance, or lack thereof, may have significant impact on the project. A better appreciation of technology acceptance may assist in planning for new technology deployment. The new KP application will provide self-service features, portability/mobility, and transparency of the transaction. These design features may address key elements of what is understood from technology acceptance such as usability, convenience, utility, and efficiency.

Specific Aim

The aim of this project is to prepare a large multicenter hospital organization for a web-based staffing and scheduling technology deployment and answer the following question: Within two sites of a system of multiple acute care hospitals (*population*), does the introduction of a web-based hospital scheduling and staffing technology (*intervention*), when compared to the legacy client-server-based system (*comparison*), improve nurse satisfaction (*outcome*) at the conclusion of new system training (*time*)?

Rationale

Theoretical framework. Complexity theory and change theory are the framework utilized for this project. Complex adaptive systems, such as healthcare organizations, bring together nonlinear processes from multiple inputs to supply information and incentives which

results in system response (Rouse, 2008). A basic example of this is the inputs of admissions, discharges, and transfers to a nursing unit, variability of patient illness burdens or acuity, and the dynamic nature of the staff themselves by way of sick calls or no-shows. These inputs result in the system response of additional shifts booked or floating qualified staff where needed and, as a result, affects the system as a whole is impacted as well as the possibly downstream effects of safe care delivery, cost, and nurse satisfaction. Complexity theory is grounded in mathematical science and strives to understand or unravel the effects of the many parts of the system to the whole (“The Information Philosopher,” n.d.). Nurse leaders, as part of the professions’ social mandate, must provide for adequate human capital resources to protect patient safety while addressing staff competency, nursing preferences, regulatory and union requirements, as well as cost (Sabet, 2005).

Kurt Lewin, often recognized as the “father of social change theories” (Kaminski, 2011, p.1210) developed a simple guide to planned change. The model includes three separate steps of the change process: unfreezing, change, and refreezing. This theory was selected because of its simplicity and solid track record of use in the nursing profession. Lewin expanded his theory to identify that both driving and restraining forces are involved in change management. Lewin’s theory explains that forces can be positive, propelling the individual or system toward change or negative, propelling us away from change. In the center, is the status quo, which can be influenced by the driving and the restraining forces. Driving forces toward change include system shortcomings of the McKesson legacy system as well as enhancements with more current technology. Restraining forces included changes to existing workflows, advanced age of the workforce along with computer anxiety, language barriers, and inexperience of the training team.

This forcefield analysis was considered throughout the project plan. Driving and restraining forces are depicted in Appendix E.

Methods

Context

KP has an opportunity to drive innovation in the space of hospital scheduling and staffing to become the healthcare industry leader. An internal assessment of staffing office managers identified current issues including excessive overtime, lack of standard workflows, antiquated software, and drift in standard staffing office practices. Included, were system limitations affecting the ability flex the workforce across medical centers and lack of sufficient scheduling codes to keep pace with changing payroll rules and regulations. Current processes are manual and paper-based. Existing workflows within the hospital staffing offices are complex and person dependent leading to the desire for future state data integration (see Appendix F). Identification of the gaps played a role in the first phase of the change process. A summary view of principal leading practices in hospital scheduling (see Appendix G) and hospital staffing practices (see Appendix H) is illustrated showing KP's relative position to benchmark practices. This assessment identified KP as lagging in each leading practice. Areas of scheduling with the greatest opportunity for improvement included standardized policies and practices, system configuration to facilitate standardized policies, and use of technology to process schedule changes. Within staffing, the areas with the greatest opportunity to improve were system integration with time and attendance technology and a decreased reliance on premium pay, such as overtime and third weekend penalty pay. The results were shared with executive leaders at the parent corporation to facilitate the message of need change.

Lessons from other industries. Lessons from the airline industry support the use of predictive analytics and automated scheduling and staffing processes. As technology advances, opportunities to leverage leading practices within and external to the health care industry exist. A review of innovative scheduling and staffing in the airline industry and in call centers was reviewed. Key findings in the airline sector speak to the importance of technological automation where possible, matching supply and demand (see Appendix I). Lessons from the call center industry demonstrated the need for robust forecasting of demand while consideration is given for skill mix and variable characteristics, such as illness burden of the patient. These lessons are depicted in Appendix J.

Stakeholders and Market Segmentation

Target audiences of this project include corporate leaders, medical center leaders, front-line staff, and regional roll-out support team (see Appendix K). Executive leaders have a relatively limited tenure to role, organization, or both. The age of this leadership group is relatively homogeneous. The regional president and each of the vice presidents have been in their role for less than two years. Approximately 80% of the permanent hospital nursing staff work part-time; 90% are hired into eight-hour shift lengths. While this yields an expensive workforce, it provides for internal expansion across the system if visibility and availability could be capitalized upon. Potentially this adds great flexibility within the existing workforce. If each part-time RN were to pick up just one additional shift at a regular rate of pay each pay period, the net result to the organization would be the realization of 890 additional full-time equivalents (FTE). This metric is important in illustrating the potential value of workforce flexibility across the system and understanding how that flexibility might assist in the overarching goal of reducing nurse fatigue. Current HR data reveals the organization is under hired by

approximately 400 RN FTEs, the RN overtime rate is nearly double the national benchmark, and there is a heavy reliance on contingent workers with approximately 300 present in the NCAL hospitals at any given time.

Governance structures. This project was commissioned by KP executive leadership in response to lagging indicators which generated a request to create the business case for change. The application IT deployment lead along with the business lead provide routine status reports to their respective leaders and the regional approval council (RAC). The RAC, consists of an eight-member board, and is responsible for funding substantial technology requests. Monthly updates are provided. This structure allows for executive level support in make strategic decisions as well as provides the opportunity to address and the larger strategic implementation. Appendix L includes a letter of project support from the sponsoring regional vice president. Governance structure for this work is depicted in Appendix M.

A working group and subject matter experts (SMEs) were tasked to not only review the technology solution, but also to make a recommendation as to the future structural approach of the NCAL staffing offices. The overall approach included synthesizing information from existing data such as leading industry practices, feedback from stake holders, as well as an assessment of overtime performance to national benchmarks. A definition of operational, business, and change management requirements were developed. Structural risks and benefits were evaluated. This project approach is depicted in Appendix N. The approach informed a timeline of approximately two years encompassing strategic planning, executive approval, implementation, and post deployment sustainability. The key activities of each phase are illustrated in Appendix O. Guiding principles when assessing the technology and structure for

this work included quality and patient safety, transparency of information, standardization, and cost-effectiveness. A visual representation of these major categories is illustrated in Appendix P.

Roles and responsibilities. Subject matter experts from operations, IT, finance, decision analytic support, and labor relations were engaged. Participants were selected for their expertise in their respective fields. See Appendix Q. Time requirements and the duration of engagement were projected for each role as depicted in Appendix R, this approach was endorsed by the parent organization and socialized with medical center leaders. The SME team conducted an assessment of functional services housed in the legacy system of each of the 21 medical centers; see Appendix S. Based on this assessment, a recommendation to executive leaders included a phased implementation approach that included: 1.) roles currently supported by the staffing office [nursing, unlicensed assistive personnel, and respiratory therapy], 2.) perioperative and environmental services, 3.) ancillary departments as depicted in Appendix T.

Prior attempts of change. This project began as a federation vision for a standard platform of hospital staffing and scheduling across the system. The plan began with the two hospitals in the north west (NW) Portland, Oregon area and the NCAL region working in tandem. The NW hospitals rolled the application out “off the shelf” with little support or product customization. They quickly experienced IT gaps in system availability and reliability. Those failures of the newly deployed system lead to added KP IT attention and prompted a reassessment of hospital staffing vendors. Results of the vendor reassessment reaffirmed the recommendation from the initial review; the original vendor was retained with the added recommendation to enter into a developer-partner relationship. This recommendation follows suit to the same close working relationship KP entered into with Epic® for the EHR. As a result of the developer-partner relationship, the Epic EHR product was altered; these enhancements

ultimately were made available to the broad Epic customer base across the nation. The vendor reassessment status update provided to executive leadership is provided in Appendix U and V.

Intervention

Purpose. The goal of this project is to prepare KP for readiness to deploy technology on a large scale affecting thousands of employees working in various roles within the organization. If the large-scale deployment is successful, this will become the KP federation standard for hospital scheduling and staffing. The organization seeks to become the nation's leader for excellence in evidence-based hospital staffing. KP's strategy of change involves organizational preparation for technology deployment that will ultimately affecting a total of 20,000 end-users across the 21-hospital system. Technology acceptance and workforce flexibility will provide key advantages in expanding the available workforce while being mindful of fatigue mitigation. This intervention may aid the health system in improving care delivery and enhancing nurse satisfaction.

Process. A detailed project plan, working with the organization's operational SMEs, the institution's IT department, and the external vendor, was developed. Illustrated in Appendix W, the work breakdown structure (WBS) outlined the overall project implementation and identifies milestones. The data dictionary of the WBS was designed to level set, assuring all parties have a common working definition of terminology. A matrix of role assignments (RACI) assisted in further delineating team responsibilities and accountabilities. While the operational lead held multiple areas of responsibility and accountability, subject matter experts in operations, IT, labor relations, corporate communications, procurement, and others were frequently consulted. The RACI is attached in Appendix X.

This foundation laid the plan and aided in identification of key milestones and dependencies for alpha site deployment. The timeline provided for this project is detailed in the Gantt chart found in Appendix Y. Significant attention was required to address possible labor relations impact as a result of workflow changes. Training material development and planning logistics, user acceptance testing of system readiness, communication pathways, as well as overall logistics planning for the go-live deployment were vital. Project implementation was aided by frequent communication with stakeholders. Weekly planning calls were held with operational leaders at the facility to assure tasks were on track and to provide support for any issues encountered. Defined steps in the readiness plan facilitated checklists for both the staffing offices and the nursing department managers to ensure the project was on track for the intended go-live date (see Appendix Z).

Hazard assessment. An overall assessment of the opportunity and hazard risks was completed in preparation for organizational readiness for deployment. There was little tolerance for damage to the mission of care delivery as a result of system failure, nor was there tolerance for reputational or brand identity harm. The identified challenges to be addressed included addressing the multiple labor unions, increased hospital census during the flu season, and IT issues experienced by the KP NW hospitals. Considerations of possible disruption to people, premises, processes, and products were gathered to understand potential sources of vulnerability. Enterprise risk strategy incorporated a deployment plan linked to the sequential publication of staff work schedules. Understanding the opportunity risks associated with the required workflow changes, such as efficiencies to be gained with IT interfaces and the consistent application of union contract rules was balanced with a low organizational appetite for risk; this is illustrated in Appendix AA.

Activities.

Risk response and monitoring plan. The organization demonstrates general intolerance for technology risk exposure. The IT risk assessment identified vulnerabilities to deployment as the NW region continued to experience periodic system outages. Root cause analyses revealed disruptions in the virtual private network (VPN) tunnel as well as IT system HL7 interface errors. Actions were put into place to address these issues; failure to adequately mitigate this risk would result in termination of the project. The end-to-end schematic of the IT infrastructure is depicted in Appendix AB. Critical and high IT issues were identified (see Appendix AC) as well as documentation of what it would take to resolve the NW region's issues (see Appendix AD). These provided a framework to address NCAL scalability (see Appendix AE).

An analysis of potential barriers, strengths, weaknesses, opportunities, and threats (SWOT) was developed, and includes internal strengths of a web-based platform providing portability, mobility and self-service features to end users. Internal weaknesses include the large-scale change, limited deployment resources with lack of training experience. External opportunities included workforce flexibility, fatigue mitigation and staff satisfaction. These opportunities may be challenged by the strength of multiple labor unions who may attempt to impede progress. The planned deployment overlaps contract negotiations with the union representing the professional nurses. The SWOT analysis (see Appendix AF), risk matrix (see Appendix AG), and risk assessment (see Appendix AH) were utilized to evaluate key dependencies. When possible, treatment of the risk to lessen the probability or impact was the desired path. An example of this risk mitigation is the engagement of corporate communications with an understanding of lessons learned from the NW prior to broad union notification. Risks that are unyielding to treatment must be either tolerated or terminated. Hospital schedules have a

fixed cadence of creation and publication which occurs every six weeks; this is a fixed risk that was accommodated in the deployment timeline.

Monitoring each of the identified risks was designed into the project plan. Early warning signs of possible vulnerabilities include misalignment between project plan and resources, missed milestones, and union grievances. Appendix AI demonstrates project's improved position after risk mitigation.

Strategic messaging. The planned NCAL deployment model is fashioned in a decentralized approach, meaning a single web-based platform for NCAL that is operationalized at each of the individual staffing offices. This provides visibility across the system when fully rolled out and minimizes the risk of future drift from standard processes. The new scheduling and staffing product was branded with the name "KP Schedule". This is meaningful to the organization and consistent with prior KP approaches of new technology execution where a developer-partner relationship was established. Much like the deployment of the electronic medical record using the Epic® product, KP entered into a contractual relationship to co-develop the product and rebranded it "KP Health Connect". The decentralized individual staffing office approach allows staffers to maintain a "face-to-face" relationship with employees and will cause minimal disruption of service from a labor relations standpoint.

The risk assessment informed the change engagement plan. Appendix AJ provides a tabular representation of stakeholder perceived and latent needs. These include financial returns, quality and safety improvements, standardization of practices, convenience, and satisfaction. Understanding the characteristics of stakeholder groups, as well as the barriers and benefits to support each, a value proposition was developed using a logic model design (W.K. Kellogg Foundation, 2006); this is further illustrated in Appendix AK and will be communicated to the

executive leadership team. Elements key to executive leaders included a return on investment as well as a positive influence on quality and safety. The overall message map (see Appendix AL) was designed to call attention to the pivotal elements of system antiquation, technological advances, and the potential to improve safe care delivery. These points are relevant to all audiences.

The communication plan was created to ensure all parties impacted directly or indirectly by the changes to the staffing office work receive timely and clear communication with content and medium appropriate to the stakeholder group. The communication plan is a key component of Lewin's second phase of change and utilizes lessons learned regarding technology acceptance. Illustrated in Appendix AM, tailored take away messages for the respective audiences are expressed. One such example is promoting the ability for the end user to utilize the application on a smart phone to view their schedule, make work requests for time off, or to pick up additional shifts. This adds a convenience to the end user not available in the legacy system.

The cascade of communications, depicted in Appendix AN considers the essential steps to creating and publishing a work schedule. Because of the organization's intolerance of adversely impacting brand identity, a detailed communication timeline and the subsequent cascade of events has been created (see Appendix AO). The labor relations component of this broad communication plan is depicted in Appendix AP; this plan detailed the sequence of notifications to organized labor (see Appendix AQ). This coordinated communication plan will help to aid in the successful deployment of this product. Details of the tactics and deliverables for the communication plan include the medium of communication such as paper and electronic mailings, start of shift huddle messages, and videos as part of the corporate communication campaign (see Appendix AR). A video clip demonstrating the new technology was shared with

medical center CNEs as well as the corporate union representing staffing office employees; it is illustrated in Appendix AS. An executive leadership mailing to alpha site staffing office employees expounding the benefits of the new technology is attached in Appendix AT. An Informational bulletin board flier (see Appendix AU) was also part of the communication campaign.

Informed by lessons from the NW region, a thorough training agenda was developed for the staffing office super-users (see Appendix AV) as well collateral training materials that were developed and utilized during the deployment. These are expressed in Appendix AW; they include a frequently asked questions tip sheet, a tri-fold quick reference guide, and local medical center intranet presence.

Financial Analysis. The technology deployment option selected by organizational leaders a decentralized approach across the 20 individual staffing offices. While the option of a centralized single physical staffing office was considered, corporate executives made the decision to maintain the existing staffing offices to minimize disruption to the current workforce. The SME work group assessed and rated the risks and benefits of the structural model of each hospital retaining their individual staffing office (decentralized model) versus implementing a single location centralized model. Comparative modeling considered efficiencies of an aggregated workforce as well as real estate and necessary infrastructure costs. The comparative 5-year net present value cost analysis yielded a \$19 million variance between the two methodologies and is displayed in the Figure 1 below. The assessment and considerations of the decentralized and centralized staffing office options are provided in Appendix AX.

	Decentralized	Centralized
Financial Impact (in Millions)		
Total 5-Year Benefits	\$48.06 M	\$104.8 M
Total 5-Year Costs	\$16.34 M	\$34.63 M
Total 5-Year Net Impact	\$31.73 M	\$70.17 M
Net Present Value	\$22.85 M	\$42.49 M

Figure 1. Comparison of Models

Financial estimates. The project assumes a 0.9% non-holiday RN overtime reduction for the decentralized approach and a 1% non-holiday RN overtime reduction for the centralized approach. These conservative estimates are based on efficiencies gained from a standardized application of contract language and, in the case of the centralized approach, a consistent user base of staffers across the system. The estimated impact, when applied to current run rate equates an annualized benefit realization of \$7.5 million and \$8.3 million, respectively. The ability to move to a single source of record will eliminate the shadow systems creating the current FTE and shift incongruence between the HR system and the staffing system. This is estimated to carry a \$6.6 million annualized cost avoidance. Discontinuation of the existing third-party vendor contracted to deliver shift broadcast alerts results in \$1.3 million annual cost avoidance. Elimination of production costs of the McKesson system avoids \$720,000 annually. Appendix AY provides an illustrative cascade of the rough annual benefit that equates to \$16 million in hard benefits. Cumulatively, these benefits are illustrated in Figure 2 below.

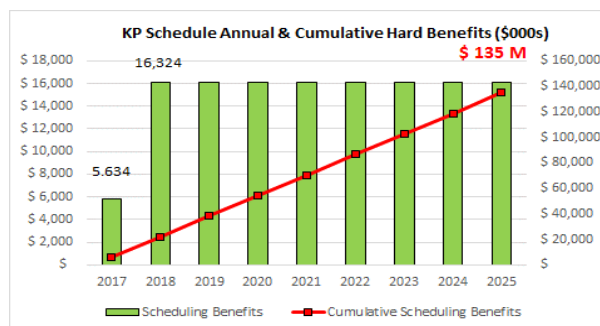


Figure 2. Cumulative hard benefits over time

Return on investment. Maximal return on investment (ROI) would be realized with a fully centralized staffing office managing the entire northern California region from a single location. A centralized model is regarded as a leading practice in the industry due to the efficient structure and ability to control variation. It would, however, require a large change effort and bargaining impact across multiple strong labor unions as well as displacement of nearly one half of the support services representatives (SSR) who fulfills the scheduling, staffing and payroll roles. The size of 21 hospital system, the complexity of a single nursing labor contract that crosses the hospital, medical group, and continuum of care entities provide additional challenges to a centralized strategy.

Capital expense estimates are recorded by major drivers of expense including IT, business operations, real estate, and staff. Within the IT bucket, software and hosting, consulting from the vendor and well as KP IT resources are booked estimates. Business costs encompass one hour of training for each end users and one week for staffing office personnel. Operating expenses are likewise recorded by major drivers of expense including IT, business operations, real estate, and staff. The majority of expense is in five additional regional staff to support the deployment and ongoing maintenance of the application. Based on an 11% cost of capital, the centralized model represents a \$42 million five-year NPV and would require 2.7 years to break even. Executive leadership, while interested in investigating a fully centralized model, has committed to deployment in a decentralized fashion, across the 20 existing NCAL staffing offices. Each medical center will maintain their individual staffing offices. This path reveals a more conservative \$22.8 million five-year NPV; the break-even point remains comparable to the centralized model.

Study of the Interventions

This section provides the design approach for the project which seeks to understand nurse satisfaction with training related to the deployment of new staffing technology. Explanations of the approach for alpha site selection as well as the method to assess the impact of the training is provided.

Site selection. A number of factors were considered in mapping out a waved deployment plan time line. Consideration was given to the time of planned deployment, historic inpatient census impact, size of medical center and thus number of employees migrating into the new system, leadership stability, and recommendations from corporate labor relations based on historic union activity. These inputs informed a matrixed assessment to produce an implementation heat map for consideration of the most prepared medical centers for alpha site deployment (See Appendix AZ). The decision for alpha site selection considered these inputs along with current issues occurring within the individual medical centers and prior experience with web-based hospital staffing systems. One medical center chief nurse executive (CNE) had previously lead the deployment of this product in another health system and as such, they were identified as a champion among the CNE group.

Deployment assumptions and dependencies (shown in Appendix AAA) identified key areas including communications, stakeholder engagement, IT system reconfiguration and validation, training development, and application deployment. The roll out activities of the deployment plan are illustrated in Appendix AAB. The overarching review of the change impact and stakeholder engagement assessment is illustrated in Appendix AAC. The SSRs who perform the daily functions of scheduling, staffing, and payroll reconciliation within the individual staffing offices were identified as having the greatest change to workflows. These staff are

mainly represented by the Service Employees International-United Healthcare Workers (SEIU-UHW) labor union.

Method to assess impact. Change management and complexity theories were utilized to guide this project. The intended outcome was to receive positive nurse responses to the deployment training as an indicator of intent to use the product. Based on the relevant review of literature, technology acceptance in nursing is tied to the following perceived functionalities: ease of use, convenience, utility, efficiency, and the support from others. These considerations were incorporated into the training survey. Understanding the perceptions of new technology in the workplace is important; failure to do so may lead to the difference between product acceptance or project rejection. If the product is not accepted, the future intent of benefit realization will be lost. This project provides the framework for deploying the new technology to two medical centers. If the technology is successfully deployed and utilized, the organization may realize the benefits of workforce flexibility and thus decrease the reliance on staff working excessive hours. Data elements for this project include nurse satisfaction with training in the new application. Future outcome measures will expand to include nurse-sensitive indicators as a measure of improved safety, RN non-holiday overtime as a percentage of productive hours as a measure of fatigue, and number of nurse submitted complaints by the corporate union's assignment despite objection (ADO) process. This also provides a bellwether for overall nurse satisfaction.

Focusing on ways to sustain and refreeze the intended change, leaders both regionally and at the local medical centers provided active support to their teams. The alpha site medical centers CNE framed the message for envisioning a better future for their staff, expounding the benefits of convenience, self-service, portability, and transparency. They were kept apprised of

any barriers to the deployment that occurred so they could redirect local efforts as required. One example of this was when a low compliance rate with end-user computer based training (CBT) completion was identified, the CNE directed additional resources to relieve staff in order for them to complete the required training. Celebrating successes is also an important aspect of the final step of the change process. The deployment team hosted a kick off celebration for approximately 100 local and corporate executives the week prior to go-live. The SSRs were provided with KP Schedule branded T-shirts during the deployment, executives were kept apprised of the status throughout the week of deployment.

Measures

Evaluation Plan. The CNE for the organization's NCAL region is the organizational sponsor for the project as well as the third reader for this quality improvement project. Data collection does not involve patient information; there is no personal health information to protect as defined by the health insurance portability and accountability act of 1996 (HIPPA). A review of the organization's institutional review board (IRB) for the protection of human subjects has determined that this project does not constitute research; it falls under the domain of process improvement. A letter from the chair of the IRB chair (see Appendix AAD) and well as the USF Statement of Non-Research Determination forms are attached (see Appendix AAE).

The perceived advantage of technology, observability or functional use of the hardware, and relevance to the practice environment have been identified as key elements to acceptance of new technology (DeVeer, Fleuren, Bekkema, & Francke, 2011; Putzer & Park, 2010; Sabet, 2005; Stimpfel, Sloan, & Aiken, 2012; "TAM," 2017). The training survey questions were devised around these principles and administered after completion of training to the new

application. Appendix AAF provides details of the data collection variables as well as a glossary of terms and specific data definitions that will inform assumptions used during the data analysis.

Data Collection, Storage, and Security. A voluntary anonymous survey (see Appendix AAG) was created using the University of San Francisco’s Qualtrics website and has been provided to the alpha site training attendees. The data analyses and recommended next steps will be reported to the corporate executive sponsor post data collection. See Appendix AAH for the data management timeline.

During the future phase of the project, outcome measures inclusive of nurse-sensitive indicators, overtime data, and ADO complaint information will be extracted using defined time segments from pre-implementation prior year, and post-implementation current year using the same time segments to control for bias from seasonal census. ADO data are aggregated and analyzed on a monthly basis. Microsoft Office, 2013 using Excel® will be utilized for analysis of financial, nurse satisfaction, and ADO measures. All data files are de-identified of any individual employee names. All files are housed on a limited access controlled corporate server that backs up nightly. A full-service IT department supports the corporate offices. De-identified alpha site baseline data have been compiled for readiness of analysis at one and a half and three months’ post deployment. Quality and operational executive leaders have authorized the nurse-sensitive risk data release (see Appendix AAI). The corporate risk management department has provided a count of recorded instances by indicator. Financial metrics are housed in an internally hosted database entitled HiFi which resides on the corporate main frame computer system. The repository provides real-time payroll and HR data by way of query parameter input from authorized users; this author and the supporting analysts have full query access. The baseline count of specified nurse-sensitive indicators for the months of August through October

2016 have been retained for the alpha sites. RN overtime as a percentage of productive hours as been isolated for the alpha site medical centers. The count of ADOs as a baseline measure has been extracted. These measures are stored on a secure drive; they will provide the baseline against which future comparative metrics will be evaluated.

Analysis

Nurses in the alpha site medical centers were provided a one hour CBT module provided by the vendor. This training provided a step-by step video tutorial and knowledge check of understanding the functionality of the new technology. Training was provided two weeks prior to the system go-live date. Immediately following the CBT, a survey was provided. Four hundred and forty responses were recorded of which 222 (50%) of the respondents identified as nurses. The two alpha sites have a nursing population of 448 RNs. If all were exposed to training during this two-week window, it would reflect a 50% survey return rate.

The survey items were input into the University of San Francisco's Qualtrics survey portal. This web-based survey tool provides an anonymous link as well as a quick response (QR) matrixed barcode that enabling participants to complete the survey from any smart device. The link and QR code was provided to all training participants. The Qualtrics software provided a count of individual responses for each of the five options of the question. A minimum, maximum, mean and variance value was also provided for each survey question.

Forty-six percent of the overall respondents identified themselves as a RN providing direct patient care, 19% as unlicensed assistive personnel, 16% as other, 5% nurse leader, 4% holding a role directly supporting scheduling, staffing and/or payroll functions, 4% as unit assistant, and 4% identified as a respiratory care provider. The demographics of the nursing population reveal an experienced workforce with 28% of participants more than 55 years of age;

the vast majority (80%) identified as female. The training survey used a five point Likert scale to compare the two systems in the following questions:

1. The application is easy to learn
2. It is convenient for the end user to access their work schedule
3. The end user has self-service features available in the application
4. The end user is easily able to view their schedule “real time”
5. The schedule codes are easily understood

The instrument was designed to capture the perception between the McKesson legacy system being sunset and the new web-based KP Schedule product. The illustration below (see Figure 3) demonstrates, with the exception of the question pertaining to ease of learning, a higher number of orange colored responses. This indicates a preference for KP Schedule over the ANSOS legacy product.

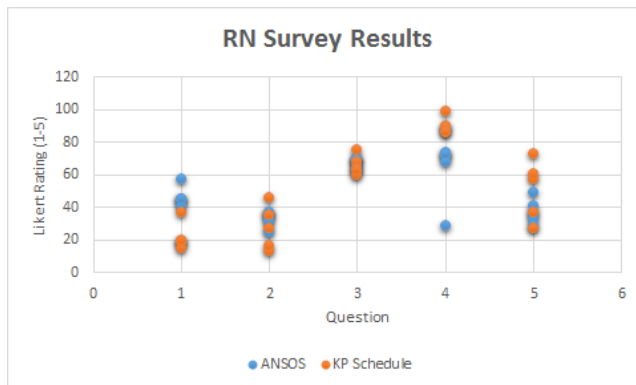


Figure 3. RN Responses, Questions 1-5

Two noncomparative questions: 1) *The training adequately prepared me to move to KP schedule* and 2) *I think KP Schedule will save me time* were added to the survey to understand the training adequacy and the perceived time savings with the new system. In such a heavily unionized environment, it was deemed not prudent to ask the respondents to quantify the estimated time savings as this may instill fear of possible lay off. The results of these questions

are displayed in Figure 4 and 5 below. They provide a directional estimate of high perceived utility of the system and overall training satisfaction.

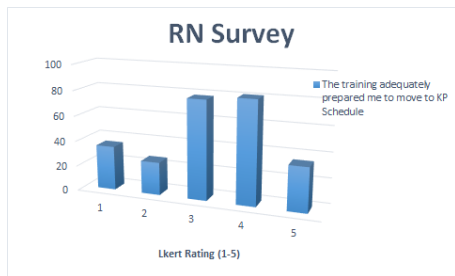


Figure 4. RN Responses, Question 6

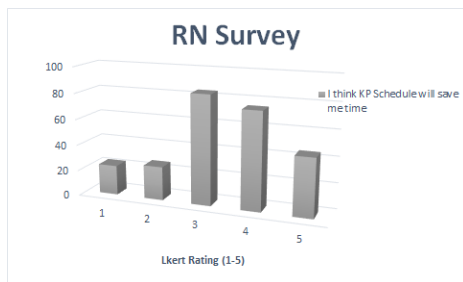


Figure 5. RN Responses, Question 7

Nurses perceptions of the new application were favorable when assessing the Likert mean values. On the five-point Likert scale a value of one indicates strong disagreement; a value of five indicates strong agreement. For each question the average (mean) score was recorded. Comparative mean Likert results between ANSOS, the legacy system, and KP Schedule is depicted in Figure 6 below. Also displayed is the variance between the mean scores for each of the five questions. The KP Schedule results revealed improvement of the mean values for each question except the first (“The application is easy to learn”). This question demonstrated a 72% negative variance. Subsequent questions two through five of convenience to access the work schedule, self-service features, schedule visibility, and schedule code understanding revealed favorable variances by 49%, 59%, 48%, and 38%, respectively. The overall mixed result is

supported by the one word visual depiction offered immediately following training (see Appendix AAJ).

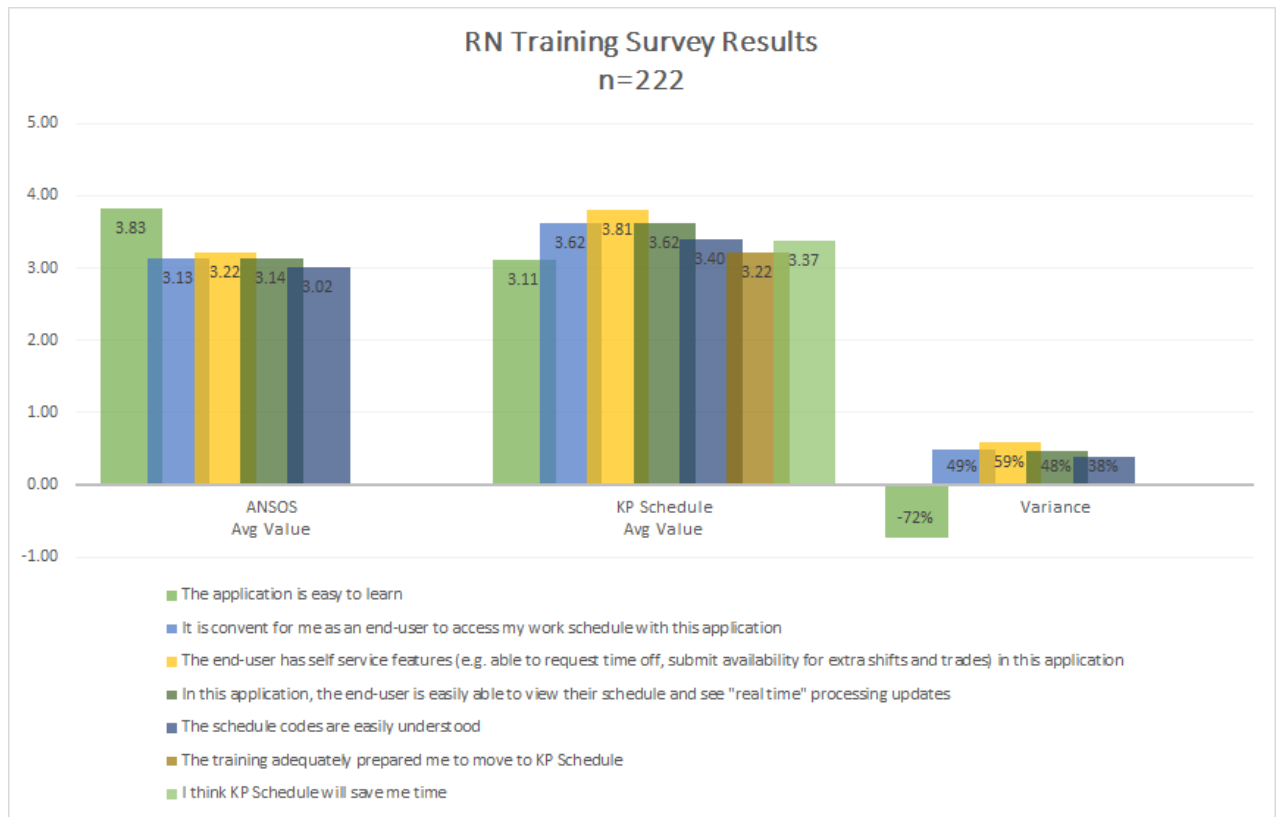


Figure 6. RN Likert Mean Survey Results and Variance

Ethical Considerations

Supporting an environment conducive to safe care delivery is a fundamental provision of the American Nurses Association practice model (American Nurses Association [ANA] model of professional nursing practice regulation website, 2017). The foundation of the professional practice model is built on evidence, encompasses scope and practice standards of the profession, a code of ethics, and specialty knowledge development. This is congruent with the Jesuit Catholic training of service, dignity, and learning ingrained in the curriculum at the University of San Francisco. These values, align to the ethos of nursing practice. They include the tending to

the whole person, service to humanity, respecting human dignity, and acting in the best interest of others (ANA, 2015).

Staffing is a fundamental required process for hospitals to provide the best quality of service to patients. The ability to find the right resources to fill open shifts in a safe and cost effective way has implications on quality of care delivery and employee satisfaction. This strategic intervention facilitates matching workforce supply and demand. The use of Uber[®]-like technology across KP might maximize a strategic position through leveraging technology to gain workforce flexibility, mitigate nurse fatigue to advance safe care delivery. This project has been determined to meet the guidelines of a non-research evidence-based change and was authorized as such by the supervising faculty on November 10, 2016. There are no identifiable issues or conflicts of interest identified for this project.

Results

This project has had a long trajectory to alpha site deployment. The initial business case was envisioned in 2013. The NCAL and the NW regions were to deploy the technology within one week of each other. The NW region deployed the hospital scheduling and staffing application in August 2015. This Portland-based hospital system experienced a bumpy go-live and subsequent IT challenges.

The need to update the legacy hospital staffing software was acknowledged. The system size and complexity, large geographic foot print, and powerful unions whose contracts that cross hospital and medical group boundaries, made this project unique. The challenges experienced by the two NW hospitals provided an opportunity to improve the system and provide learnings to the NCAL deployment team. The parent company has embarked on a close working relationship with the vendor in addition to providing additional IT support. This, in turn, has provided the

NW region with a more stable platform. This improved reliability and availability of the product will add strength to scale the application across NCAL.

Survey data was collected immediately after end-user training in the two weeks prior to the application going live and thus the perceived effect is a result of the training rather than from actual use of the system. Feedback from the end-users provided rich information in that the CBT module was not especially helpful or engaging. This feedback resulted in a change in go-live support to include teams deployed on patient care areas in order to deliver just in time training. The presence of training support was allocated on site for two weeks following the system going into live production and will lead to changes in the training deployment plan for future deployment.

Discussion

Summary

This quality improvement project, can be considered a success. The two alpha site medical centers are live in daily staffing production on the new system, there has been no significant union resistance and the overall early measures of nurse satisfaction, are favorable. This work will inform future deployment waves and can act as a resource for other leaders embarking on deploying web-based hospital staffing technology. Taken in context of the organization's history of not being agile, this deployment is a big step forward to aid in addressing the needs of its workforce and the patients under its care.

A key finding from the project was insight to variables that affect technology acceptance. It is to be seen if staff will embrace or reject the new technology. Antiquated stand-alone systems produce an organizational vulnerability for its human capital resources. The data file interfaces between the HR and timekeeping systems of record will shore up this risk while

decreasing manual work of staff. Without robust technology, the ability to address the major cost structures of hospital operations is hampered. When fully deployed, this will be the largest application of web-based hospital scheduling and staffing that this author is aware of. We must innovate and not remain trapped by traditional ways of the past. This requires curiosity, use of analytics and evidence, as well as true collaboration to break down silos.

Lessons learned. There were many lessons to be had with this improvement project; some were out of frustration; all were impactful. This work provides a road map along with detours and lessons to facilitate moving staffing from an art to a science. For others leaders committed to moving hospital staffing into data-driven science, these are lessons to consider:

1. Never underestimate the challenges that come with any IT project.
 - a. Certain technology applications only work well with specified internet browsers.
 - b. End-users will forget their computer passwords. Be prepared to provide a quick way to reset them.
 - c. Hospital guest Wi-Fi networks may restrict mobile application functionality which may lead to end-user frustration.
2. Over communicate.
 - a. Organizational branded messages may be overlooked with end-users. Look to local leaders to understand their staff and best ways to communicate frequently and in a variety of formats.
 - b. Provide quick job aids that can fit in the pocket of a lab coat or on the ID badge.
 - c. Understand break-through languages and ensure job aids have been translated to meet user needs.

- d. Provide task checklists and have weekly calls with the medical centers to ensure the project plan is on track.
- 3. Training must be robust. Vendor produced computer based training, while accurate, may not be meaningful to end users.
 - a. Learn from early deployment efforts and adjust. Where possible, plan to have an excess of just-in-time training sessions with staff.
 - b. Identify and engage super users in the staffing office and on the nursing units.
- 4. Employ enough resources with a mix of fundamental knowledge skills of staffing, training, IT, and experience with labor unions.

Implications for the profession. Hospital nurse scheduling and staffing are dynamic complex processes. By embracing the use of electronic scheduling and staffing systems nurse leaders can uncover new approaches to staffing that are grounded in evidence and ultimately contribute to the wellbeing of our patients, the organizations we serve, and the profession. The nurse leader has a moral imperative to understand existing evidence and act to make positive contributions. Safe patient care does not happen by chance. For every positive encounter with a clinician, someone was responsible for providing the right person in the right place, at the right time. With inquiry, data analytics, and experiential wisdom, perhaps we can do this with more intention. This work adds to the body of evidence in this field. Further study is necessary to understand the practical impact of web-based scheduling and staffing across a multi-hospital system on staff satisfaction, care delivery outcomes, and cost.

Interpretation

This work supports findings from prior publications assessing nurses’ attitudes toward new technology and their intent to utilize new technology. Feedback from the nurse participants

receiving training in the web-based scheduling and staffing technology, indicated positive results for technology acceptance. They indicated a belief that the new system may provide gains in ease of use, convenience, and time savings. It is early to understand if these gains will be realized and the resulting impact. As additional hospitals come on line, nursing staff will progressively have full visibility across NCAL and thus have the ability to indicate their individual needs in control of their work-life balance.

This work has provided opportunities to shine a light on the importance of hospital staffing and provided an opportunity for local leaders to grow and be recognized for facilitating KP's step into the 21st century. To embrace what it means to be a learning organization, the nursing profession will need to advance evidence-based knowledge and use of business intelligence to identify the workforce tools of the future.

Limitations

The findings of this work are limited to those participants of training in the application and who voluntarily completed the satisfaction survey. Results were anonymously recorded. Because of this, the author is unable to determine if the nursing population were all exposed to the survey. Likewise, there is no ability to confirm that respondents have only completed one survey.

The sample includes participants from two medical centers within one system of multiple hospitals in NCAL and thus, the results are not generalizable. Because the survey was delivered immediately after training in the new application, performance bias may be present.

Additionally, the survey participants may not have had ample time to assess the capabilities of the new system. This work is set in the state of California which is heavily regulated and highly represented by organized labor; results may not be generalizable to other areas of the country.

Conclusions

This work builds on prior evidence of understanding factors for successful deployment of technology to nursing staff and incorporates information from a perspective of current constraints within KP Northern California. It provides an innovative approach to apply evidence-based practice to support excellence in hospital staffing.

This project provided an opportunity to work collaboratively with multidisciplinary stakeholders to ultimately affect system-wide improvements. The desire for standardization and efficiencies brought together multiple facets of IT expertise, legal and contract procurement experts, labor relations specialists, HR experts, and a variety of leadership touch points. The project training goals were met; future work into the understanding the effects of the applied technology across KP is needed. If hospital administrators can contribute to the health and well-being of its employees, improved care outcomes and a decreased institutional turnover may be realized. Consequences to patients, caregivers, administrators, and policy makers are significant. Further study on the impact of this wide-scale application is necessary.

Other Information

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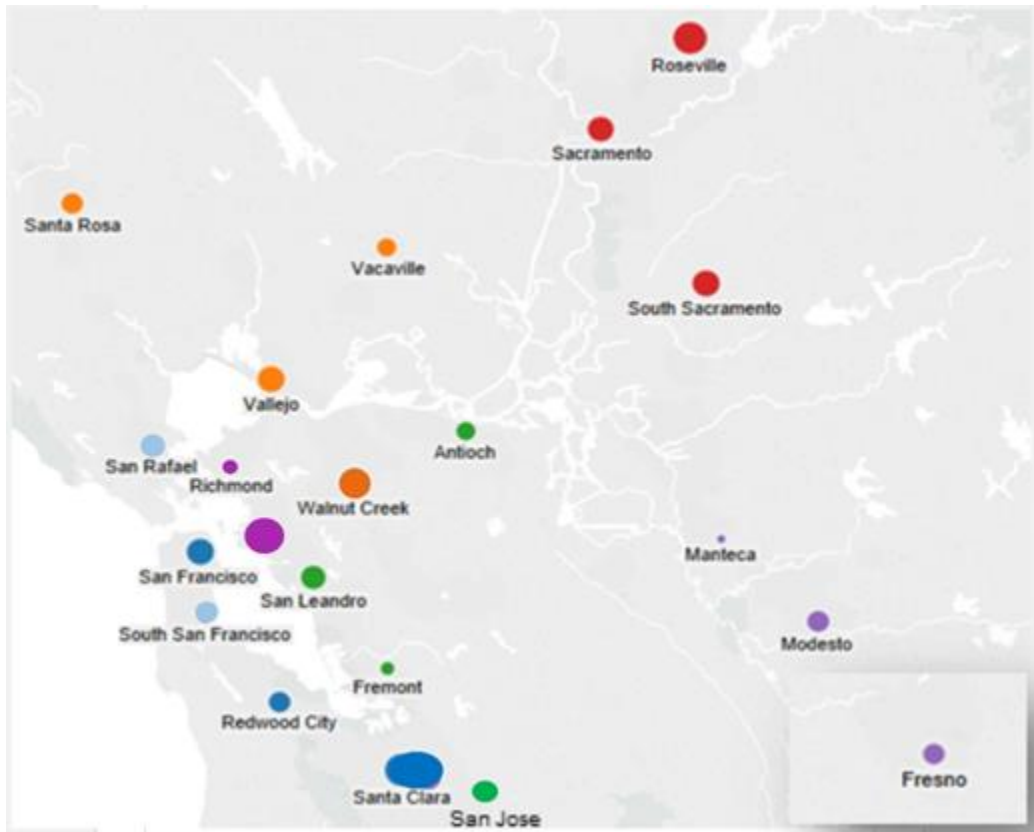
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Appendix A

Geographic Footprint of KP NCAL Hospitals



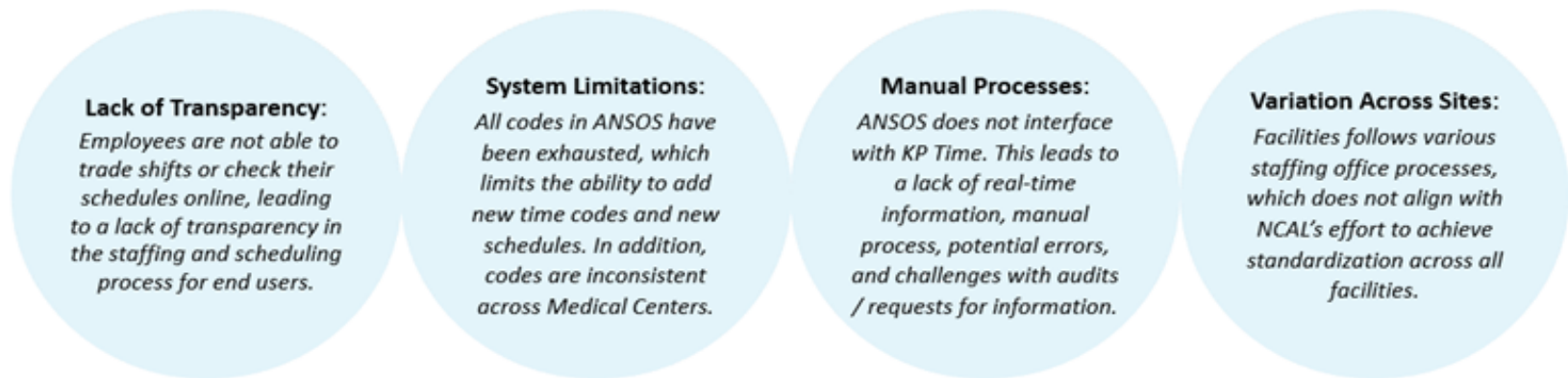
Appendix B

System Limitations

Current System Limitations: A Case for Change

KP chose API through a vendor selection process to replace the antiquated ANSOS staffing and scheduling system, and to introduce transparency, standardization and efficiency to the staffing office processes.

- In 2014, Operational Excellence (OE) Leadership created the Staffing Effectiveness structure to address the root causes of staffing-related issues, and to support KP NCAL region as it moves toward leading practice in scheduling and staffing practices
- ANSOS users frequently mention the following pain points:



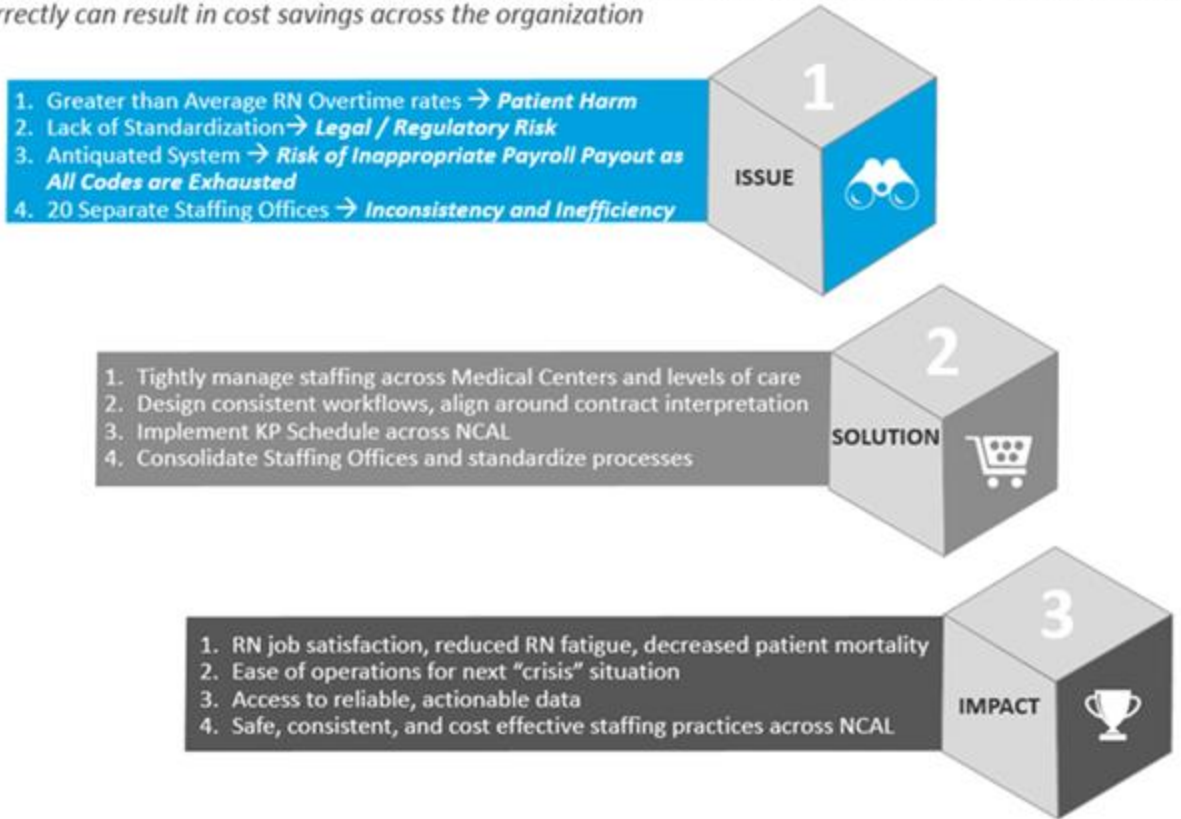
API was selected to address the above pain points through transparency, configurability, efficiency and standardization.

Appendix C

Urgency for Change

Urgency for Change

Effective scheduling and staffing practices are tied to patient safety, employee satisfaction, and if deployed correctly can result in cost savings across the organization



Appendix D

Table 1. Evaluation Table

Citation	Design/Method	Sample/Setting	Major Variables	Measurement	Data Analysis	Findings	Appraisal of Worth Strength of Evidence
Adams, Kaplow, Dominy & Stroud (2015)	Organizational non-research QI	6-hospital + 1 clinic system in Atlanta.	Evaluate internal float pool efficacy	coverage goal: 7,200hrs/quarter reduction of external agency staff cost savings from external agency use cost savings from orientation	each goal met or exceeded	Coverage: 133% of goal external agency hours reduced by 70% OT reduced by 5,322 hrs. Orientation time reduced by 32 hrs. hired 312 RNs by Q4	Johns Hopkins Nursing Evidence-based Practice (JHNEBP) NON-Research Evidence Appraisal Strength: V Quality: A
Clendon, J. & Gibbons, V. (2015)	Systematic Review Three step strategy: 1. search of Cochrane, Joanna Briggs Institute, MEDLINE, and CINAHL 2. Embase, Current contents, Proquest Nursing and Allied Health Source, Proquest Theses and Dissertations, Dissertation Abstracts International 3. studies published in English before 2014	n= 5,429 publications 26 studies met inclusion criteria 13 were deemed high enough quality for review	shift length \geq 12 hrs. errors in nurses care delivery (use of Benner et al.'s taxonomy)	inclusion criteria: English published studies before August 2014 that included registered nurses (RN), licensed vocational nurses (LVN), 12 hour or longer shifts comparison to shorter shift length	summary of the 13 studies suggest a strong relationship 3 studies reported no significance difference in error rates. One of the studies reported no difference (95% CI: 0.90,2.38) between shifts less than or greater than 12 hours in length	Risk of making an error is increased in nursing working 12+ hours Consider limiting shift length to 8-10 hours Further research is needed to consider mitigation factors to risk of error in 12 hr. shifts	JHNEB NON-Research Evidence Appraisal Strength: IV Quality: A Confounding factors identified and strategies to address in 8 studies Limitations: associated variables in error (e.g. fatigue, stress levels, hand-off practices, skill mix, and scheduling practices) were not included. Broad definition of error using Benner et al.'s taxonomy
Drake, R (2013)	quasi-experimental voluntary longitudinal study	n= 630 rosters 800 bed private hospital in Malaysia	auto rostering vs manual rostering 1. % of approved shift requests 2. % of shifts rostered automatically by e-Roster system 3. % of shifts assigned manually 4. % of shifts changed after roster approved/published 5. % of roster rules broken by end of roster period	linear regression analysis R2 ($\alpha=0.5$)	Significance level of $<1\%$: Ho 1: correlation between staff requests and roster robustness Ho 2: inverse relationship between rostering rule breakage and auto roster Ho3: direct relationship between breaking rules and manual processes Ho4: 6 of 15 units demonstrate rules broken related post approval changes	Less scheduling rules broken with use of auto-rostering software	JHNEB Evidence Appraisal Strength: II Quality: B Limitations: attrition in many units may underestimate relationship
de Veer, A, Fleuren, M., Bekkema, N., Francke, A. (2011)	non-experimental survey	n=1,018 67% response rate (nurses and nursing assistants) in the Netherlands	1. What kinds of technologies have recently been introduced... how do nursing staff value the way these are introduced (innovation process)? 2. What determinants impede or enhance the introduction of new technologies according to nursing	Characteristics of (a) the technology; (b) nursing staff as users; (c) the organization, and (d) the socio-political context	Coding done by two researchers (interrater reliability of 81%) Chi-square to explore relationships	Postive determinants to use included ease of use as well as perceived benefit to the patient. Training, coaching, and access to help desk supported adoption. Only half of the introduced processes were positively rated by nursing staff.	JHNEB Evidence Appraisal Level of Evidence Strength: III Quality: B Limitations: respondents did not clearly identify determinants or socio-political context
Ellis (2008)	white paper literature review Washington State Nurses Association		nurse work schedules, fatigue, medical errors, patient outcomes			increasing patient acuity, nursing shortage, erratic census drives overtime use, causing nurse fatigue which contributes to medical errors and compromises patient safety	JHNEB Evidence Appraisal Level of Evidence Strength: II Quality: C

Citation	Design/Method	Sample/Setting	Major Variables	Measurement	Data Analysis	Findings	Appraisal of Worth Strength of Evidence
Hansen, A. M., Nabe-Nielsen, K., Albertsen, K., Høgh, A., Lund, H., Hvid, H., & Garde, A. H. (2015)	quasi-experimental study	n = 1070 Group A= union represented psych hospital setting Group B= psych hospital Group C= union represented call center	pre/post survey: Job satisfaction, Social climate, Influence on working hours after implementation of self-rostering software	Job demands/satisfaction: Copenhagen Psychosocial Questionnaire (COPSOQ); Social Climate: Negative acts at work place as measure of signs of conflict (Negative Acts Questionnaire) ANOVA using IBM SPSS statistical software (v.20)	social support from colleagues increased significantly in intervention group (p= 0.01 for interaction and 0.15 for effect estimate at 95% CI: 0.04-0.27); Adjusting for perceived influence on the arrangement of working hours only marginally changed the effect (p= 0.018 for interaction and 0.15 for effect estimate at 95% CI: 0.02-0.26)	Psychosocial factors highly correlated between emotional and quantitative demands (p=0.436) & negative correlation between job satisfaction and work related negative acts (p=0.460) Overall, social support increased in intervention group compared to reference group	JHNEB Evidence Appraisal Strength: II, Quality: A adjusted for age and gender; Limitations: non-randomized population; Group C had no baseline representation; baseline and follow up surveys may have had too short of time between the two (9 months)
Kaye, S. (2017)	Literature review	n= 496 14 met inclusion criteria	Meaningful use technology: Electronic health records (EHR), barcode medication administration (BCMA), and nursing clinical decision support (CDS)	Inclusion criteria: English published articles pertaining to meaningful use between January 2010- July 2015 Databases: CINAH, MedLine, ScienceDirect, PsychINFO, and Proquest	Studies summarized in extraction matrix to summarize methodology, purpose, and theme.	Principal acceptance to change was based on peer support and perceived ease of use (usability) Principal barrier to change when workflow alterations affected job efficiency Age was negatively correlated with acceptance in 5 studies	JHNEB NON-Research Evidence Appraisal Strength: IV Quality: B Limitations: half of the studies were dissertations and thus lacked the peer-review process Publication bias may exist in published articles Number of studies and sample sizes of some of the studies were limited
Kerr, F. & Timony, Y. (2009)	non-experimental exploratory survey	600 bed teaching hospital in Dublin, Ireland n=50 (response rate 80%): Nurse managers, Asst. DON, RNs, Clerical staff	experience (time) in rostering; most important aspects of roster; rostering benefits	response rate by percentage of whole by variable (zoomerang survey) 1. computer skills, 2. nursing education level, 3. length of time responsible for rostering, 4. prior rostering experience, 5. current rostering experience, 6. time to prepare roster, 7. roster complexity, 8. key aspects of a roster, 9. computer vs paper roster choice, 10. rostering benefits, 11. benefits to others, 12. training satisfaction	thematic analysis from open ended questions Rosterling is a complex process; Staff in charge of rostering have little experience. 85% of survey participants chose electronic rostering over paper systems	1. computer skills- 56% said intermediate 2. length of time rostering- 56% had 0-2 yrs. 3. Prior experiencing rostering- 59% yes; 41% no 4. eRosterling experience- 17%; 88% via paper 5. Roster preparation- 33% say it takes days to complete; 33% indicate up to 1hr to complete 6. Roster choice- 85% prefer eRoster 7. Benefits of electronic-reports (29%), easy access/retrieval (27%), track leaves (21%), identify patterns of work (13%)	JHNEB Evidence Appraisal Level of Evidence Strength: III Quality: C Limitations: no statistical analysis of data
Leineweber, et al. (2016)	non-experimental exploratory survey (RN4CAST)	n= 23,076 RNs (2,020 nursing units in 384 hospitals spanning 10 countries in Europe)	nurse practice environment (PES-NWI-R) schedule flexibility intention to leave workplace intention to leave profession	Multilevel modeling of intention to leave current workplace and/or the profession	Intention to leave workplace three subscales of the PES-NWI-R tool: 1. Staffing and resources (OR= 0.984; 95% CI: 0.977-0.989) 2. Nursing impact on hospital affairs (OR= 0.988; 95% CI: 0.980-0.995) 3. Nurse-physician relationship (OR= 0.994; 95%CI: 0.988-0.999)	Intention to leave the profession was largely explained by individual factors (e.g. age, years of service) Intention to leave the workplace was largely influenced by organizational factors such as work environment and schedule flexibility.	JHNEB Evidence Appraisal Strength: III Quality: A
Lobo, V. et al. (2014)	literature review	653 search yield > 93 articles reviewed > 9 for final analysis	Overtime cost and patient outcome	regression analysis used by 7, Pearson correlations, and Poisson's test		although weak evidence, there is a positive association between overtime and poor patient outcomes consider alternatives to provide workforce flexibility (e.g. increase full-time are increase part-time staff)	JHNEB NON-Research Evidence Appraisal Strength: IV Quality: B

Citation	Design/Method	Sample/Setting	Major Variables	Measurement	Data Analysis	Findings	Appraisal of Worth Strength of Evidence
Maenhout, B., & Vanhoucke, M. (2013)	Quasi experimental design using nurse scheduling problem instance generator (NSPGen) to assess effects of scheduling policy changes	n=80 RN staff from 1,069 bed not for profit university hospital in Belgium	job satisfaction; effectiveness, efficiency, & overall schedule quality	Wilcoxon test with $\alpha=0.05$ calculate % scores from scenarios best result (100%) to worst (0%) results 1. staffing & scheduling at unit level 1a. Aggregate staffing and disaggregate scheduling 1b. Staffing & scheduling carried out by unit 2. staff several similar units simultaneously 3. budget for all units and then staff and schedule by nurse chr (heterogeneous)	cross-utilization (float pool) increases nurse satisfaction of schedule quality 70.92% (at 95% CI: 64.35%-77.49%) schedule flexibility to float staff yields significantly improved job satisfaction 85.48% (at 95% CI: 85.09%-85.86%) the longer the work stretch, the lower the nurse satisfaction 85.21% (at 95% CI: 73.72%-96.70%)	scheduling & staffing multiple units using mathematical heuristics is better than decentralized approach higher the flexibility in scheduling equates to higher job satisfaction & unit efficiency but inversely effects providing high-quality care	JHNEB Evidence Appraisal Strength: II Quality: B Limited sample size (3 nursing units) Lack of analytic rigor; analysis looks at scoring %
Martin, D. (2015)	non-experimental survey	n=9 volunteers pre/post survey of fatigue using the Occupational Fatigue Exhaustion Recovery (OFER) survey	nurse fatigue (OFER) & shift length demographics, job satisfaction, questions about factors in and outside of work that may influence fatigue	altered shift length from 12hrs to 8 hrs. for four week period electronic Checkbox Survey to assess fatigue twice during the 12hr shift and as post test	Microsoft Excel 2010 and statistical package of social sciences (SPSS) 21.0 Wilcoxon matched-pairs test used to examine the effect of shift length	sleep increased 22 minutes/day with 8hr shifts ($p=0.059$) hours worked increased with 8hr shifts by an avg of 51 minutes/week acute fatigue difference was $p=0.279$ for chronic fatigue was $p=0.144$; inter-shift recovery time $p=0.027$	JHNEB Evidence Appraisal Strength: III Quality: C Limitations: small sample size to provide adequate power analysis
Putzer, G. & Park, Y. (2010)	non-experimental survey	80 responses from 200 surveys (40% completion rate) RNs from 2 community hospitals in South Eastern USA	dependent variable: attitude toward smartphone use independent variables: observability, compatibility, job relevance, personal demographics, personal experience, internal environment, external environment	Each predictor had Cronbach's alpha value of > 0.70 indicating internal consistency and measurement precision Pearson's correlation coefficients between factors limited to factors that exceeded limit of 0.5	No relationship between attitude toward smartphone and behavioral intention to use. Regression analysis of variables. Overall F-value= 12.96 (significant at 0.01)	Innovation characteristics help explain technology adoption. Smartphones take advantage of versatility and portability and can be used as a tool in healthcare delivery	JHNEB Evidence Appraisal Strength: III Quality: B Limitations: small sample size, low response rate, one geographical area
Sharifian, Askarian, Nematollahi, & Farhadi (2014)	non-experimental cross-sectional survey	n=350 nurses in 5 hospitals associated with Shiraz University of Medical Sciences, Shiraz, Iran 87% response rate	1. performance expectancy on intent to adopt 2. effort expectancy on intent to adopt 3. social influence on intent to adopt 4. facilitation of conditions on intent to adopt	5-point Likert scale	Cronbach's alpha to examine the reliability of each factor. All constructs exceeded 0.83 alpha (satisfactory reliability).	Each of the 4 Ho supported with a significance level of 99%	JHNEB Evidence Appraisal Strength: III Quality: B Strengths: Sample size is adequate; High response rate Limitations: 5 hospitals in Iran
Stimpfel, A.W. & Aiken, L.H. (2013)	non-experimental cross-sectional survey	multi (4)-state pt. safety study (2005-2008) and 2006 AHA annual hospital survey n=22,275	shift length, demographics, scheduling characteristics, work break patterns, work environment, perceptions of quality of care and safety	shift length to scheduling practices, quality and safety perception ICU and non-ICU separated	raw and adjusted OR each demonstrated shift length of 10+ hours were significantly associated with reported quality at 95% CI (OR 1.26-2.69) and safety concerns at 95% CI (OR 1.18-2.38)	nurses reported concerns over quality and safety with shifts 10+ hours; 2 x higher with longest shift lengths CA only state to protect break and rest time via legislation CA has best staffing (1 less pt. on avg than PA and NJ)	JHNEB Evidence Appraisal Strength: III Quality: A

Citation	Design/Method	Sample/Setting	Major Variables	Measurement	Data Analysis	Findings	Appraisal of Worth Strength of Evidence
Strudwick, G. (2015)	literature review	primary research published since 2000 n= 982 results; only 20 studies met inclusion criteria	Predictive nurses' use of healthcare technology using technology acceptance model (TAM): Ease of use, usefulness, patient safety, training, facilitating conditions, personality traits, computer anxiety, job relevance, social influence, and experience as a nurse	search of Ovid/MEDLINE, PubMed, Google Scholar, and CINAHL using keywords TAM, TAM2, UTAUT, nurses, and technology acceptance model	all studies were assessed using a critical appraisal skills program	TAM accounted for 87% of the variables	JHNEB NON-Research Evidence Appraisal Strength: IV Quality: B Limitations: TAM does not account for external variables such as years of work experience, support from physicians and administrators No measure of actual use was reported in several studies
Trinkoff, A. et al. (2011)	non-experimental cross-sectional survey	n=633 2004 study across 2 states Secondary study from the Nurses Work life and Health Study	a. hours worked/day b. hours worked/week c. weekends worked/month d. number of breaks of 10+ minutes e. shift rotation f. frequency of 13+ hours worked g. frequency of <10 hrs. off between shifts h. work on scheduled day off i. work while ill j. worked on mandatory overtime k. required on call hours l. typical number of consecutive days of work	Discharge data risk adjusted Agency from Healthcare and Quality Inpatient Quality Indicators (mortality rates) & staffing data from American Hospital Association Annual survey	study hospitals averaged 7.5 hours/patient day (hppd); overall NC and IL as a whole average 5.7 hppd Adverse work schedules were associated with higher mortality rates: pneumonia deaths were associated with long work hours (OR = 1.42 at 95% CI: 1.17-1.73), and lack of time away from work (OR = 1.24 at 95% CI: 1.03-1.50); abdominal aortic aneurysm (AAA) deaths with lack of time away from work (OR =1.39 at 95% CI: 1.11-1.73); congestive heart failure (CHF) deaths with working while sick (OR = 1.39 at 95% CI: 1.13-	adverse work schedules are associated with higher mortality rates in pneumonia, AAA, CHF, and AMI	JHNEB Level of Evidence Strength: III Quality: B
Wright, D. & Bretthauer, K.M. (2010)	quasi-experimental	data from 3 nursing units in 1 not for profit 526 bed hospital in Midwestern US	Looked at 3 different census patterns (shifts): High, Medium, Low to 3 staffing models (closed unit, internal float pool, agency RNs) Analyzed costs (straight time & OT) & count of undesirable shifts	cost, desirability of shift on a cost percentage basis	internal float strategy yielded 16.3% lower cost than agency use; fewer undesirable shifts use of agency RNs reduce staff overtime with only a 0.7% cost increase	internal float pool has lower costs, fewer OT shifts, fewer undesirable shifts. Agency model provided better schedules with less OT, schedules with labor cost within 0.9% of myopic strategy	JHNEB Evidence Appraisal Strength: II Quality: B limited sample size & generalizability
Wright & Mahar (2013)	quasi-experimental	522 scheduling instances from 3 M/S data in units at 2 Midwestern hospitals of 247 & 526 bed capacity	centralized scheduling with technology vs decentralized scheduling Labor costs, schedule desirability	sum of unit costs (decentralized) compared to the cost obtained with centralized model	% improvement to control% improvement to control Centralized out performs decentralized by 10.7% for labor costs and aver of 34% for undesirable shifts; OT reduced by 80%	Centralized scheduling with computer technology out performs decentralized scheduling may increase nurse satisfaction and decrease attrition rates	JHNEB Evidence Appraisal Strength: II Quality: B Limitations: did not address confounders (e.g. consecutive shift constraints, consecutive days off constraints, etc.); only centralize scheduling
Yankovsky, A., Gajewski, B., & Dunton, N. (2016)	non-experimental longitudinal data analysis of technical efficiency using data envelopment analysis (DEA)	National Database of Nursing Quality Indicators (NDNQI) from 1,217 hospitals spanning 19 quarters (2007-2011) n=7,355	hppd (RN, LVN, UAP), fall rate, pressure ulcer rate in adult service lines	Linear mixed model with bootstrap comparing efficiency score to mean and variance	using SAS (classic) and bootstrap techniques with t-test statistics	predictors of efficiency include time, Magnet status, unit type correlations: estimates (1.00), standard errors (0.99), t statistics (1.00) DEA is an improvement over prior research in efficiency	JHNEB Evidence Appraisal Strength: III Quality: A Limitations: NDNQI data over represents large hospitals thus not generalizable

Table adapted from Melnyk, B.M. & Fineout-Overholt, E. (2015)
CI = Confidence Interval

Table 2. Comparison of Variables

Studies (Author & Year)																				
	Adams, Kaplow, Dorniny & Stroud (2015)	Clendon, J. & Gibbons, V. (2015)	Drake, R (2013)	de Veer, A, Fleuren, M., Bekkema, N., Francke, A. (2011)	Ellis (2008)	Hansen, A. M., et al. (2015)	Kaye, S. (2017)	Kerr, F. & Timony, Y. (2009)	Leineweber, et al. (2016)	Lobo, V. et al. (2014)	Maenhout, B., & Vanhoucke, M. (2013)	Martin (2015)	Putzer, G. & Park, Y. (2010)	Sharifian, Askarian, Nematollahi, & Fahadi (2014)	Stimpfel, A.W. & Aiken, L.H. (2013)	Strudwick, G. (2015)	Trinkoff, A. et al. (2011)	Wright, D. & Bretthauer, K.M. (2010)	Wright & Mahar (2013)	Yankovsky, A., Gajewski, B., & Dunton, N. (2016)
satisfaction (RN)				x	x	x		x	x		x		x	x	x		x	x	x	
Technology acceptance							x							x		x				
patient outcome (quality/safety)		x			x					x					x		x			x
shift length/RN fatigue		x			x							x			x		x			
schedule effectiveness	x		x								x									
schedule efficiency											x									
overall schedule quality											x									
workforce expansion	x				x															
centralized approach																			x	
schedule rule breakage			x																	
cost																			x	x
overtime					x					x							x			

Table adapted from Melnyk, B.M. & Fineout-Overholt, E. (2015)

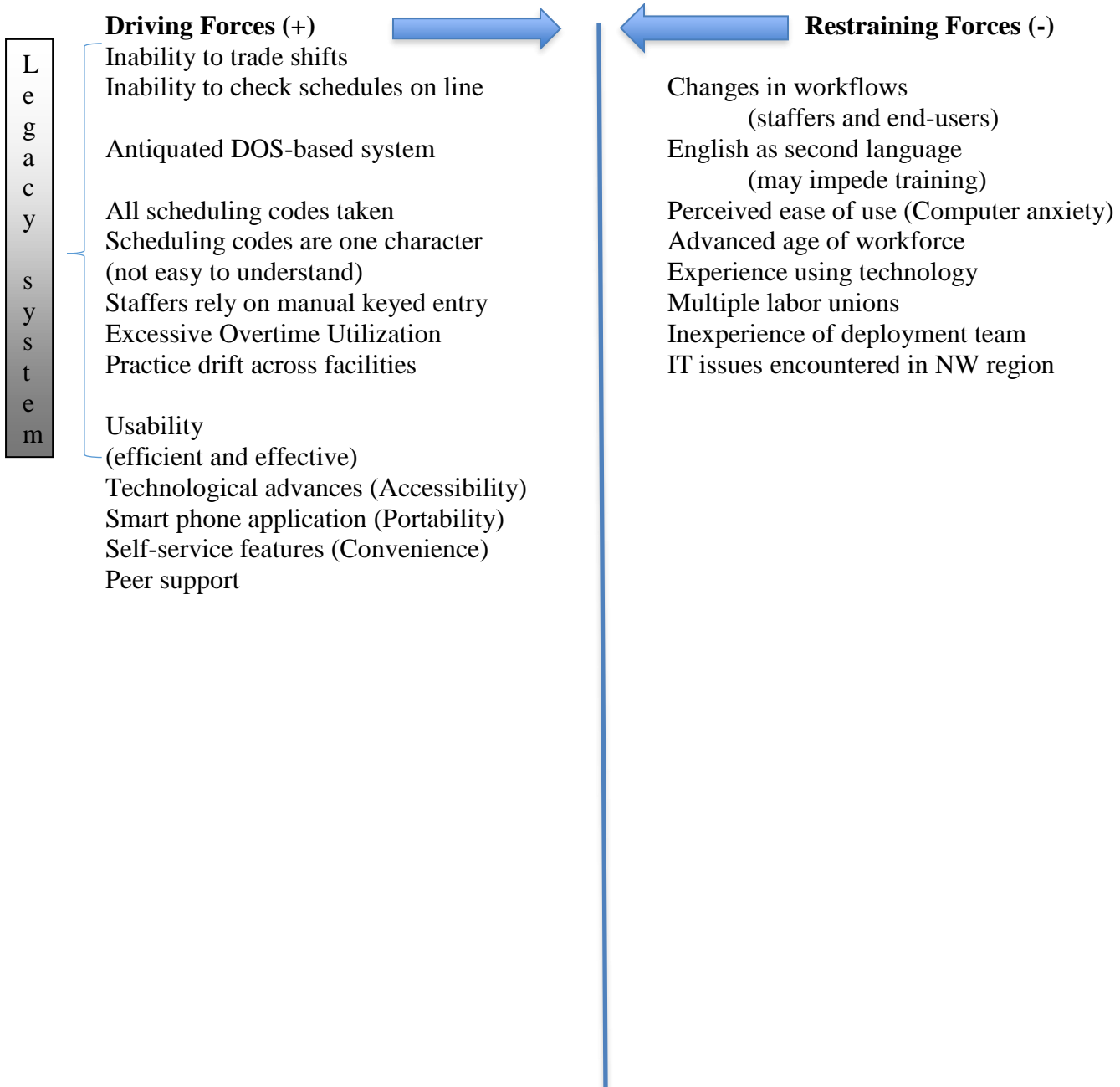
Table 3. Synthesis Table

Studies (Author & Year)	Adams, Kaplow, Dorniny & Stroud (2015)	Clendon, J. & Gibbons, V. (2015)	Drake, R (2013)	de Veer, A, Fleuren, M., Bekkema, N., Francke, A. (2011)	Ellis (2008)	Hansen, A. M., et al. (2015)	Kaye, S. (2017)	Kerr, F. & Timony, Y. (2009)	Leineweber, et al. (2016)	Lobo, V. et al. (2014)	Maenhout, B., & Vanhoucke, M. (2013)	Martin (2015)	Putzer, G. & Park, Y. (2010)	Sharifian, Askarian, Nematollahi, & Fahadi (2014)	Stimpfel, A.W. & Aiken, L.H. (2013)	Strudwick, G. (2015)	Trinkoff, A. et al. (2011)	Wright, D. & Bretthauer, K.M. (2010)	Wright & Mahar (2013)	Yankovsky, A., Gajewski, B., & Dunton, N. (2016)
Intervention																				
Technology/Mathematical modeling	x		x	x		x	x	x	x		x		x	x		x		x	x	
Shift Length		x			x							x			x		x			
Workforce flexibility/expansion	x				x				x	x								x	x	
Outcome																				
Quality/Safety of care outcome		x			x					x					x	x	x			x
Cost reduction/schedule efficiency	x		x		x					x	x				x	x		x	x	x
Nurse satisfaction/technology acceptance			x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	
Nurse fatigue					x							x			x		x			

Table adapted from Melnyk, B.M. & Fineout-Overholt, E. (2015)

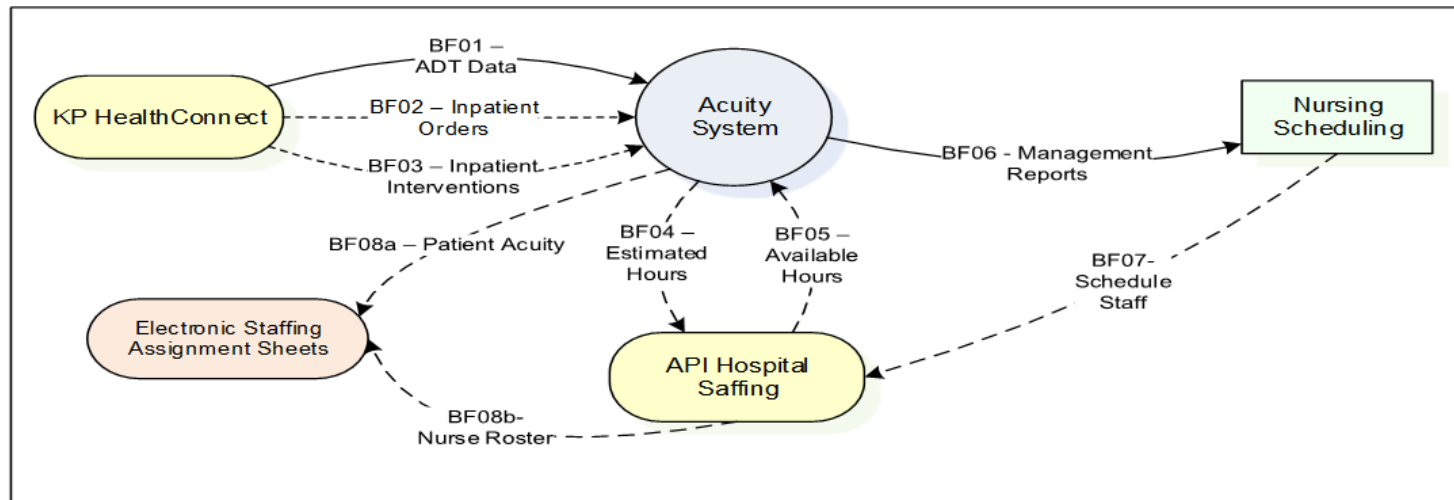
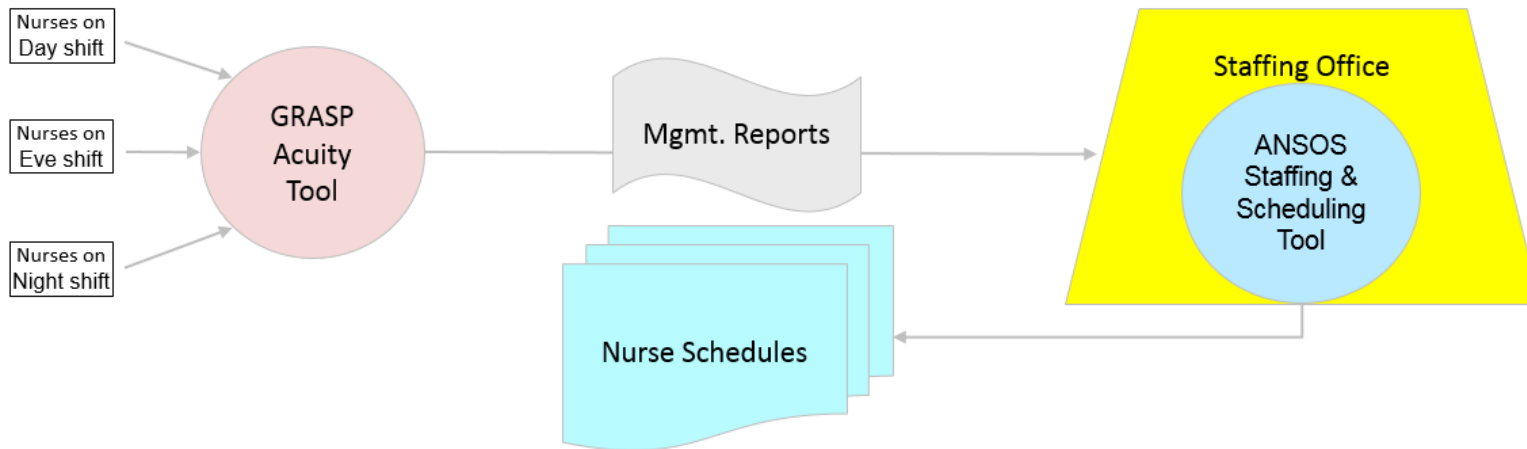
Appendix E

**Lewin's Change Theory:
Applied to Hospital scheduling & staffing web-based technology**



Appendix F

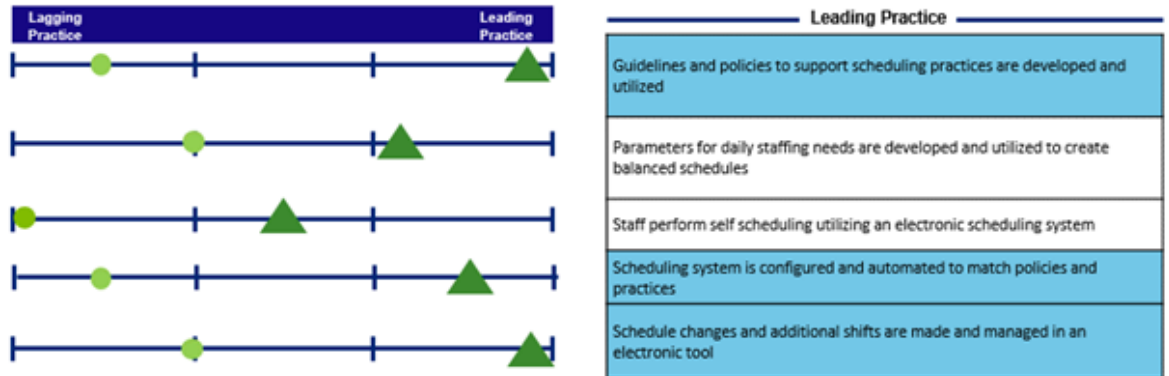
Current State vs Future State



Appendix G

Leading Practice Model | Central Scheduling

Through site visits and interviews, leading practice models were completed for KP NCAL staffing and scheduling and were used to drive recommendations for future state design



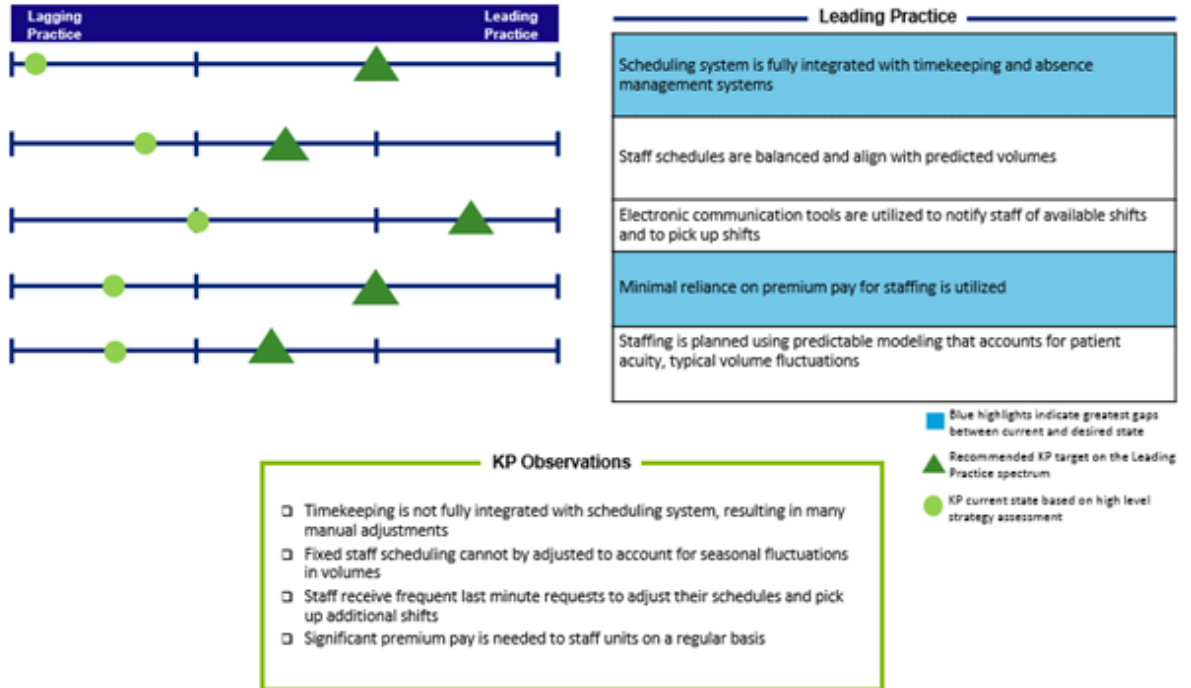
- KP Observations**
- Standardized staffing policies have not been enforced due to varying interpretation of union contracts
 - Schedules are entered manually into electronic tools
 - Updates to schedules are routinely done through a highly manual process
 - Self-scheduling is currently not possible due to fixed schedule requirements from existing union contracts
 - Some schedule changes and additional shifts are made and managed in an electronic tool

- Blue highlights indicate greatest gaps between current and desired state
- ▲ Recommended KP target on the Leading Practice spectrum
- KP current state based on high level strategy assessment

Appendix H

Leading Practice Model | Staffing

Through site visits and interviews, leading practice models were completed for KP NCAL staffing and scheduling and were used to drive recommendations for future state design



Appendix I

Innovative Staffing and Scheduling Practices | Airline Industry

The airline industry has seen significant efficiency gains by investing in better predictive analytics and integrating related scheduling processes as much as possible

Recent Trends in the Industry:¹

- **Integration of fleet scheduling, aircraft routing, and crew pairing** has led to significant cost-savings due to reduced crew connections and better feedback between the (airline) schedule development process and crew scheduling process. Technology has enabled this integration as it has removed many manual processes that had traditionally kept the processes functionally siloed
- **Strategic crew/aircraft swaps based on passenger demand forecasting closer to the day-of departure** has increased overall profitability by more accurately matching passenger demand with aircraft capacity
- **Refined fleet assignments between sub-fleets** sometimes serve as an intermediate step towards greater integration of crew and scheduling processes
- **Research into automated schedule creation** that incorporates revenue management, operational, and cost factors is expected to increase network profitability
- **Research into innovative staffing practices, such as dictating only the time a crewmember is set to work and assigning the location as needed**, may increase the flexibility of the workforce. However, for many US based carriers, this solution may violate existing collective bargaining agreements with crew rank and file

Results:

- American Airlines reduced the number of flight deck crew connections for one of its fleets from 330 to 35 per day by integrating crew and scheduling processes, saving 100 hours of pilot and first office labor per operating day
- Southwest has been able to reduce crew swaps (and related inefficiencies) by taking a holistic approach to crew and aircraft scheduling

Key Takeaways:

- The staffing/scheduling process should be automated as much as possible and evaluated in conjunction with related processes to realize the greatest profitability; “downtime”, or non productive time should be minimized where possible
- Financial metrics should be key inputs when making scheduling decisions
- Predictive analytics should be leveraged to match resources with actual demand more accurately
- Research should be done into ways to increase the flexibility of the workforce within the confines of union contracts



1. Jacobs, Timothy L., et al. "Airline planning and schedule development." *Quantitative Problem Solving Methods in the Airline Industry*. Springer US, 2012. 35-99.

Appendix J

Innovative Staffing and Scheduling Practices | Call Center Industry

Call Centers have experienced efficiency gains by investing in predictive analytics and appropriate use of different skill levels

Recent Trends in the Industry:¹

- **Integration of forecasting, hiring, staffing, scheduling, and call routing processes** leads to better resource utilization and customer service quality
- **Finding the right mix of flexible and specialized agents** allows call centers to better match customer types and agent skills
- **Forecasting models** are used to make better hiring and resource deployment decisions

Results:

- Refined skill mix in resource pools positively affects agent learning, career paths, job satisfaction, and attrition rates, ultimately leading to better operational performance
- Better demand forecasting produces a reduction in the variability of forecasted daily volumes of 50%, leading to a greater ability to deploy an adequate number of resources

Key Takeaways:

- Staffing and scheduling should be integrated with demand forecasting functions to improve quality of service (e.g., patient care quality)
- Staffing must take into account different customer characteristics (e.g., in healthcare, this includes metrics such as acuity)
- Having the correct skill mix is important in ensuring quality customer service, which has implications on float pool design and Staffing Office skills sets (e.g., clinical vs. non-clinical)
- Accurate forecasting of both long-term demand (to make better hiring decisions) and short-term demand (to make better staffing decisions) can result in increased operational effectiveness



1. Aksin, Zeynep, Mor Armony, and Vijay Mehrotra. "The modern call center: A multi-disciplinary perspective on operations management research." *Production and Operations Management* 16.6 (2007): 665-688

Appendix K

Stakeholder Characteristics

Audience Segmentation	Characteristics
<p>Corporate leadership *Regional President *Regional Vice-Presidents</p>	<p>*Well educated * Predominately Female *Age ranges mid-late 50s *New to role and/or organization *Strong advocate for nursing *Value evidence-based practice</p>
<p>Front-line end-users *Principally RNs *Unlicensed Assistive Personnel *Secretarial Support *Para -professionals</p>	<p>* Predominately Female *Avg. Age: 50 years * 80% RNs work Part-time *Heavy union influence *RNs mostly Associate Degree educated *want to know <i>what's in it for me</i> *Comfortable with technology/social media</p>
<p>Regional Roll-out Support * Labor Relations * Human Resources * KP-Information Technology (KPIT) *Corporate Communications</p>	<p>* Well educated * New to project role * Multiple players including technical experts and project managers</p>

Appendix L

Letter of Support

7/1/2016

University of San Francisco, School of Nursing
2130 Fulton Street
San Francisco, CA 94117-1080

To whom it may concern:

I am writing to express my support of Lisa J Massarweh to implement her Doctor of Nursing Practice Comprehensive Project at Kaiser Permanente. Massarweh's project is of significant scope. She will be sun setting our existing legacy scheduling and staffing system while deploying a web-based application across our Northern California hospitals.

We give her permission to use the name of our agency in her Comprehensive Project Paper and in future presentations and publications. This letter also verifies that Kaiser Permanente has an existing contract with the University of San Francisco's School of Nursing.

A handwritten signature in black ink that reads "Theresa M Brodrick". The signature is written in a cursive style and is positioned above a horizontal line.

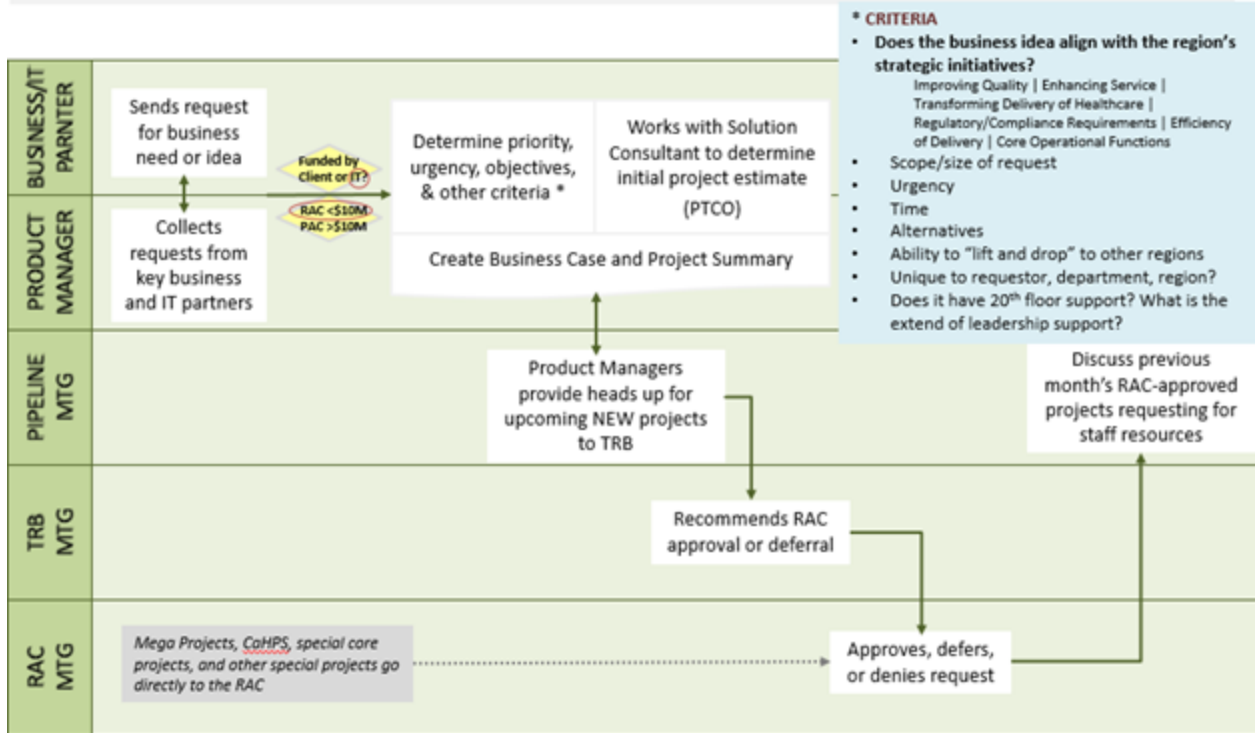
Theresa Brodrick, RN, PhD

Regional Chief Nursing Officer, VP Clinical Integration, Kaiser Permanente, Northern California

Appendix M

NEW Project Requests | RAC-IT Governance

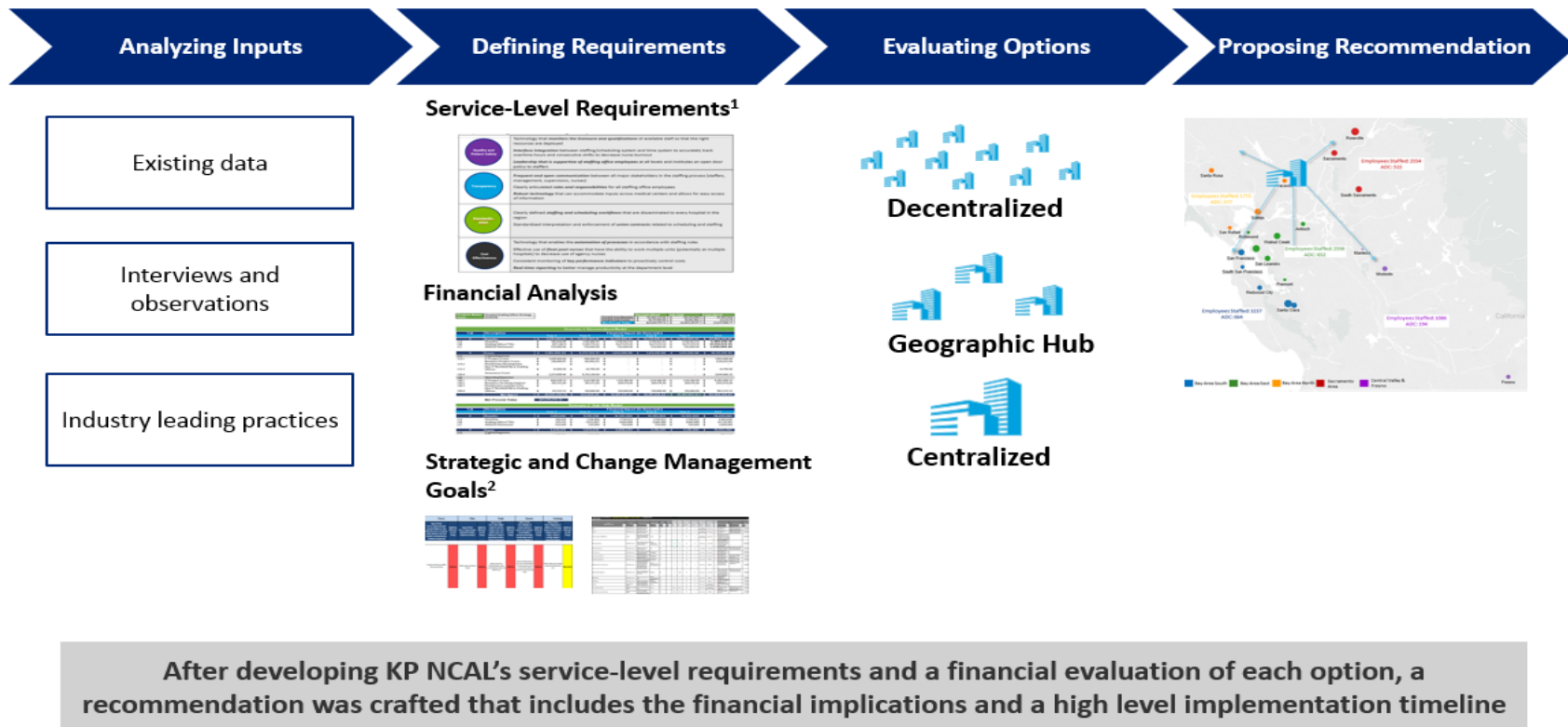
Product Manager collects requests from key business and IT partners for 1) upcoming year, focusing on continuing or new projects; 2) throughout current year: immediate, urgent solutions needed or new requests.



Appendix N

Project Approach

Recommendations are based on evaluating KP’s current state, develop an understanding of business requirements, and by engaging a team of KP SMEs that will design and implement the selected Staffing Office model

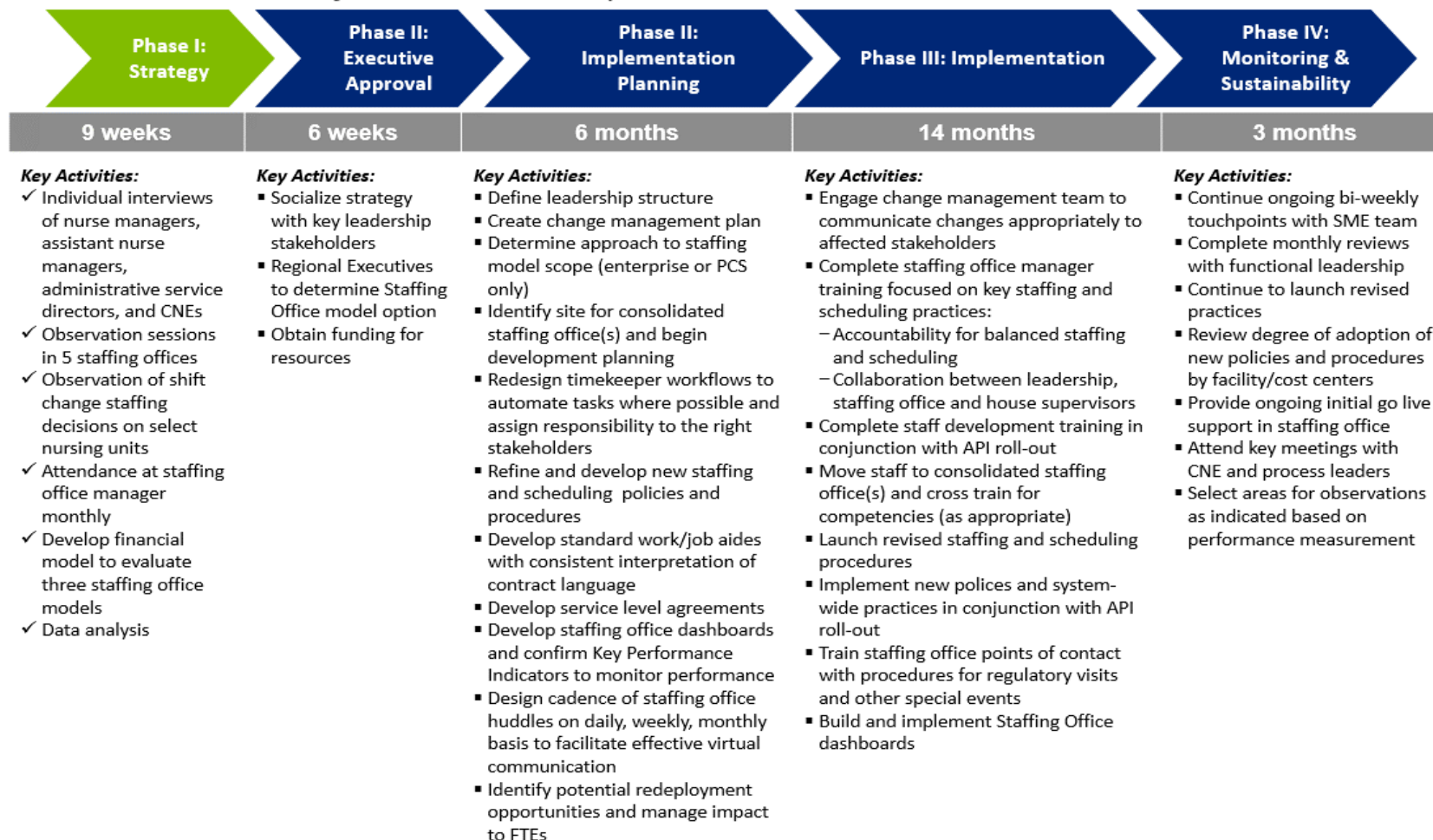


1. Service level requirement details to be specified
2. As defined by the KP cross functional governance team

Appendix O

High-Level Timeline

Full implementation of the Staffing Office model, including detailed planning and implementation, coincides with the waved rollout of the AKP Schedule system



Appendix P

Guiding Principles for Choosing the Best Model for KP

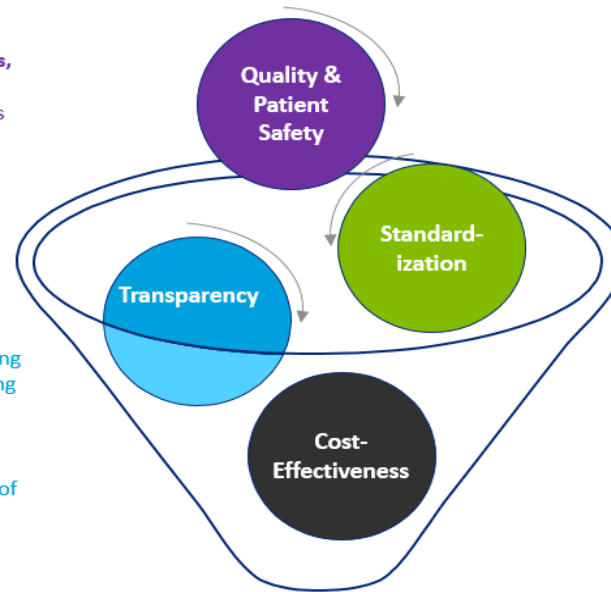
The following guiding principles were identified by the working group and SME team to evaluate the potential staffing office models

Quality and Patient Safety

Deploy staff with the **correct licensures, competency skills, and certifications**
Align goals of staffing office employees to positively impact patient safety and high quality care
Encourage consistency and continuity of care by reducing staff fatigue, turnover, and vacancies

Transparency

Increase the visibility of decision-making process for both the employee + staffing office employees + managers
Increase employee confidence and satisfaction with staffing procedures
Increase accountability and efficiency of communication for all employee and employer
 Employee self service functionality will improve employee satisfaction



Standardization

Increase clarity and align expectations regarding staffing office roles and responsibilities
Standardized codes and protocols and standardize the processes between hospitals
Standardize which job codes and departments are in scope and which are out of scope
Enforce uniform interpretation and execution of union contracts, policies, and procedures

Cost-Effectiveness

Decrease costs due to overlap in overhead, premium pay incentives, agency costs, and use of decision support tools for the application
Identify cost-savings associated with streamlining or consolidating operations
Improve accuracy of budgeting and decision making by units based on productivity data
Improve efficiency in employee work processes

Unique Characteristics of KP

System Size

The size and geographic spread of KP's hospital system may require sub-regional focuses to maintain efficiency

System Complexity

KP's payer-provider structure and separate TPMG and KFH groups make it a uniquely complex medical group

Powerful Unions

Multiple powerful unions challenge KP's ability to quickly implement innovative solutions across the NCAL region

Appendix Q

KP Schedule Implementation Subject Matter Expert Team

The SME team



Appendix R

Resourcing Assumptions: Consistent Performance



**Project: API/Hospital Staffing Office –
Shared Services Resource Needs**

Project Duration: 24 Months

Role Title	Number of Resources	Full Time Dedicated (Yes/No)	Skill Focus	Est. Start	Est. End	Weekly Average Hours ¹
Executive Sponsor	1	No	▪ Expert in organization design, operations and leadership	4/16	4/18	2
Project Lead	1	No	▪ Expert in hospital staffing, organizational design, operations, and leadership	4/16	4/18	20
CNO	2	No	▪ Knowledge of current state <u>NCal</u> processes and procedures, roles, goals, metrics, and operating models. Director or Leader in <u>NCal</u> PCS	4/16	4/18	5
ASD	3	No	▪ Knowledge of current state <u>NCal</u> processes and procedures, roles, goals, metrics, and operating models. Director or Leader in <u>NCal</u> PCS	4/16	4/18	5
AFO	1	No	▪ Knowledge of current state <u>NCal</u> processes and procedures, roles, goals, metrics, and operating models. Director or Leader in <u>NCal</u> HR	4/16	4/18	5
Labor Relations	1	Yes	▪ Knowledge of current state <u>NCal</u> processes and procedures, roles, goals, metrics, and operating models. Director or Leader in <u>Kaiser NCAl</u> .	4/16	4/18	5
Staffing Office Manager	1	No	▪ Knowledge of current state <u>NCAL</u> Staffing Office processes and procedures.	4/16	4/18	5
SSR	2	No	▪ Knowledge of current state <u>NCAL</u> Staffing Office processes and procedures.	9/16	4/18	5
KPIT	3	No	▪ Knowledge of technology systems throughout KP, experience with interfacing various KP technologies, API experience	4/16	4/18	5
HR	1	No	▪ Knowledge of HR systems to reconcile <u>ANSOS</u> records that do not currently match HR data	4/16	4/18	4
Decision Support	1	No	▪ Experience creating reports in a SQL database, input on API interfaces with other IT systems, and input on KP <u>Insight</u> on-line position control	4/16	4/18	5
<u>Change Mgmt</u>	1	No	▪ Experience with managing large scale corporate change efforts	4/16	4/18	2
<u>Disability Mgmt</u>	1	No	▪ Expertise regarding impact of if/when Medical Centers need to fill positions with modified duty staff	4/16	4/18	1
DCEPI	1	No	▪ Experience with leading education efforts in the Medical Center	4/16	4/18	1

¹Average Weekly Hours may vary and represent an estimate over the length of the project
²Additional SMEs may be identified as needed

Appendix S

Current Scope of Staffing Offices by Medical Center

Of the eight departments currently receiving scheduling and staffing services across the region, four departments are strategically aligned with a vision for a supply/demand center, and should be considered for the future state Enterprise Staffing model. The remaining four departments should continue with the API implementation and should be evaluated further for integration into Enterprise Staffing.

Current State								
Facility	Phase 1 Implementation		Phase 2 Implementation		Consider for Phase 3 Implementation			
	PCS	Respiratory Therapy	Peri-op	EVS	Food Preparation	Facilities Services (Engineering)	Materials Management	Facility Communications
Oakland	Yes	Yes	No	No	Yes	No	No	No
Richmond	Yes	No	No	Yes	Yes	No	No	Yes
San Leandro	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fremont	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
San Jose	Yes	No	Yes	No	No	No	No	No
Santa Clara	Yes	No	Yes	No	No	No	No	No
Redwood City	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
South San Francisco	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
San Francisco	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
San Rafael	Yes	No	Yes	No	No	No	No	No
Santa Rosa	Yes	Yes	Yes	No	No	No	No	No
Vallejo	Yes	No	No	No	No	No	No	No
Walnut Creek	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Antioch	Yes	Yes	No	Yes	Yes	No	Yes	No
Roseville	Yes	No	No	Yes	No	No	No	No
Sacramento	Yes	No	Yes	Yes	No	No	No	No
South Sacramento	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Manteca	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Modesto	Yes	Yes	Yes	Yes	Yes	No	No	No
Fresno	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Vacaville	Yes	No	No	No	No	No	No	No
Total ¹	21	12	12	14	13	8	9	10
Percentage of System	100%	57%	57%	67%	62%	38%	43%	48%
# of NCAL Employees ²	12,153	750	2,415	2,328	411	479	740	265

Yes- currently on ANSOS and using Scheduling / Staffing services

No- currently on ANSOS, and Scheduling / Staffing is done at the Department

1.Source: NCAL KFH Hired 1-11-2016.csv | Received From: Lidia Malinowska
 2. Source: Department Survey Results per Service Line_for Deloitte.xlsx : Received from Lidia Malinowska

Appendix T

Phased Approach to Staffing Office Implementation

Departments should be prioritized based on their impact on throughput and bed management, size, and complexity of staffing

Phase	Departments Included	Rationale
Phase 1	Patient Care Services	<ul style="list-style-type: none"> • Direct impact on throughput and bed management • Largest number of employees • Same reporting structure (through nursing) • Complex staffing needs
	Respiratory Therapy	
Phase 2	Peri-op	<ul style="list-style-type: none"> • Aligned with throughput and bed management goals • Large number of employees • Departments largely already staffed by the staffing office
	Environmental Services	
Phase 3	Food Prep	<ul style="list-style-type: none"> • Less direct impact on bed management and throughput • Smaller number of employees • Investigation should be done to see whether these departments have the capacity to staff at the department level given the smaller size of each department and less alignment with strategic goals
	Facility Services (Engineering)	
	Materials Mgm't	
	Facility Communications	

Appendix U

Hospital Staffing Office / KP Schedule - SBAR

Situation:

- ◆ Not long after NW went live on KP Schedule, the region began to experience failures and unplanned outages. Six months later, NCAL paused the project while escalating solution availability concerns to GE. Little progress was made by GE.
- ◆ KP worked with GE to complete an architecture assessment to understand the underlying causes for the failures and performance issues. A review of the findings and recommendations were presented to KP leadership in July 2016.
- ◆ Many of the recommendations presented became the basis for the go-to-green roadmap. The target completion was to occur prior to NCAL’s alpha deployment in November 2016. At this point, the project resumed.
- ◆ While planning and preparing for the alpha deployment in NCAL, NW continued to experience system performance issues and outages. This raised concerns about performance and scalability for a successful NCAL implementation.

Background:

- ◆ The driver for the Hospital Staffing Office project is to improve operational performance and productivity across the 20 offices that support staffing of nurses across all KP NCAL medical centers. The current system is ANSOS which has been in place for approximately 30 years.
- ◆ A vendor search was conducted in 2014 and API Healthcare Corporation (now GE) was selected as the vendor of choice. The intention was to implement their staffing and scheduling system as a OneKP solution on a hosted platform, now referred to as KP Schedule
- ◆ Kaiser Northwest implemented the solution in 2015 with the intention for NCAL to follow the next week to align to start of pay periods. The project was put on pause by executive leadership in mid June/early July 2015 and Deloitte was consulted. Recommendations from that work was subsequently supported and the project resumed in the summer 2016.

Assessment:

















- ◆ Vendor issues identified as affecting NCAL’s HSO alpha deployment date
 1. **Performance and Availability** – Consistent errors and failures in two key areas: Schedule Grid and Broadcast Messaging
 2. **Core Functionality** – Functionality impacted or not available in three key areas: Shift Trade, Schedule Grid, and Broadcast Messaging
 3. **GE’s Data Center Move** – timing of data center will occur immediately following NCAL’s November deployment date which will result in an outage end users.
- ◆ Vendor contract expires 10/2/16 and renewal is necessary

Recommendations:

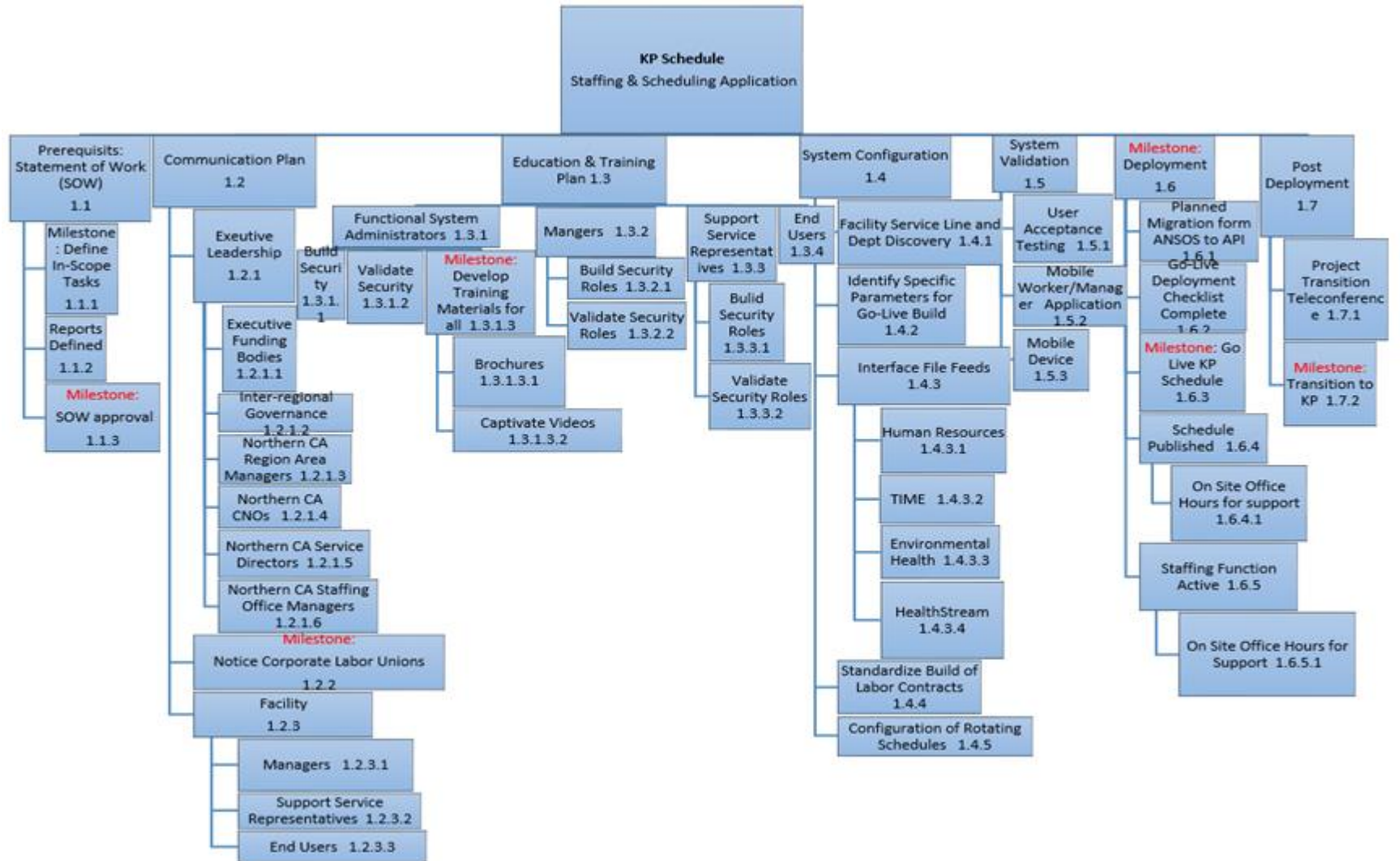
- ◆ Conduct a vendor search to identify other viable solution and assess if KP should continue to invest in API/GE or engage with another vendor. Key activities include:
 - Conduct a RFP with top 3-4 vendors
 - Assess vendor fit and solution capabilities
 - Identify preferred vendor and present selection to leadership for next steps
- ◆ Concurrently, the project team will continue to partner with GE on activities and tasks related to planning events and deliverables that benefit both NCAL & NW
- ◆ With the postponement of training, we are not pursuing the November 27, 2016 Alpha deployment date

Appendix V

VENDOR SEARCH & ASSESSMENT STATUS UPDATE

Sponsor(s)	Theresa Brodrick	IT Executive Leader	Kevin Hart	Report Date:	10/14/16																																				
Planning Team Points of Contacts	Denise Seymour (PM), Diana Rotheneder (BTP), Haranath Gnana (SC)	Business Leaders	Lisa Massarweh Philomena Whelan	Overall Status:	 Completed																																				
Summary/Objective: After reviewing NCAL's project implementation assessment with leadership on 9/9/16 to highlight key vendor and technical concerns and the go-forward options available, the project team was tasked with conducting a new vendor search. The purpose of the vendor search is to identify and recommend alternate vendors that provide: <ul style="list-style-type: none"> • Similar or more capabilities than what is available with API/KP Schedule • Addresses the performance, stability and availability concerns present with the current vendor solution. 																																									
Activities and Accomplishments			IT & Business Leadership Action(s) Requested																																						
<ul style="list-style-type: none"> ✓ Completed vendor demos to assess product functionality and technical. Vendors reviewed were McKesson, Kronos, Cerner and <u>Avantas</u> (<i>functionality demo internally provided by business also completed for GE/API</i>) ✓ Finalized findings with recommendations and presented to executive leadership for feedback 																																									
Next Actions			Deliverables / Milestones Summary																																						
<ul style="list-style-type: none"> <input type="checkbox"/> Work with GE to establish a development partner relationship <input type="checkbox"/> Work with GE to complete contract extension for 4 months (short-term) and update master agreement contract (long-term) 			<table border="1"> <thead> <tr> <th>What</th> <th>Start</th> <th>End</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>Identify Key Vendors, Solution Capabilities & Contact Vendors</td> <td>9/12/16</td> <td>9/16/16</td> <td>100%</td> </tr> <tr> <td>Identify top 3-4 Vendors & Solidify Business requirements with Ranking</td> <td>9/19/16</td> <td>9/23/16</td> <td>100%</td> </tr> <tr> <td>Engage and Assess Vendors for the Rapid Assessment</td> <td>9/26/16</td> <td>10/07/16</td> <td>100%</td> </tr> <tr> <td>Finalize & Present Findings / Executive Decision Pt.</td> <td>10/9/16</td> <td>10/14/16</td> <td>100%</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			What	Start	End	Status	Identify Key Vendors, Solution Capabilities & Contact Vendors	9/12/16	9/16/16	100%	Identify top 3-4 Vendors & Solidify Business requirements with Ranking	9/19/16	9/23/16	100%	Engage and Assess Vendors for the Rapid Assessment	9/26/16	10/07/16	100%	Finalize & Present Findings / Executive Decision Pt.	10/9/16	10/14/16	100%																
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Assessment Summary			<table border="0"> <tr> <td></td> <td>On schedule</td> <td></td> <td>Completed</td> </tr> <tr> <td></td> <td>Behind schedule, being monitored</td> <td></td> <td>Not yet started</td> </tr> <tr> <td></td> <td>Delayed with major roadblocks</td> <td></td> <td></td> </tr> </table>				On schedule		Completed		Behind schedule, being monitored		Not yet started		Delayed with major roadblocks																										
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	Behind schedule, being monitored		Not yet started																																						
	Delayed with major roadblocks																																								
<ul style="list-style-type: none"> ▪ None of the large vendors assessed had a solution better than GE ▪ <u>Avantas</u>, the smallest player, offered a more current solution with a lot of potential but it still had key business capability gaps ▪ Recommendations were: <ul style="list-style-type: none"> ✓ Re-engage with GE under a Development Partner model ✓ Alternate (backup plan): reconsider Kronos. They aligned the closest with KP business capability needs compared to the rest 																																									

Appendix W



Work Breakdown Structure (WBS)

Level	WBS Code	Element Name	Definition
1	1	KP Schedule	Scheduling and Staffing System to replace ANSOS One Staff legacy hospital application
2	1.1	Prerequisites: Statement of Work (SOW)	Contract defining work to be completed by the vendor.
3	1.1.1	<i>Milestone:</i> Define In-Scope Tasks	Definition of tasks the vendor will need to complete in the SOW
3	1.1.2	Reports Defined	Listing of reports required from the scheduling and staffing application.
3	1.1.3	<i>Milestone:</i> SOW Approval	Legal Document of SOW fully executed by legal teams.
2	1.2	Communication Plan	Defined plan by which to communicate the application change with stakeholders
3	1.2.1	Executive Leadership	Regional Leadership including corporate President & Vice Presidents
4	1.2.1.1	Executive Funding Bodies	Regional Approval Committee (RAC) which includes KFH operational executives, medical group executives, IT executives
4	1.2.1.2	Interregional Governance	Leadership across KP regions (this project is a NCAL & KPNW partnership)
4	1.2.1.3	NCAL Area Managers	KP Northern California Hospital Area Managers; may oversee >1 hospital.
4	1.2.1.4	NCAL Chief Nurse Executives	KP Northern California hospital Chief Nurse Executives
4	1.2.1.5	NCAL Service Directors	KP Northern California hospital nursing directors by service line (Adult, Maternal Child Health, Perioperative, Administrative)
4	1.2.1.6	NCAL Staffing Office Managers	KP Northern California hospital Staffing Office Manager team
3	1.2.2	Corporate Labor Unions	Organized Labor Leadership for each of the unions that represent affected employees
3	1.2.3	Facility	Hospital or Ambulatory Surgical Center
4	1.2.3.1	Managers	Non-represented managers of affected employees
4	1.2.3.2	Support Service Representatives (SSR)	Staffing and Scheduling employees in the facilities. These employees are the super-users of the application and are represented by organized labor. The employee reports to the Staffing Office Manager.
4	1.2.3.3	End Users	The employee using the application to request days off, days to work, verify work schedule

2	1.3	Education & Training Plan	Work plan to detail role-specific education and training in the application
3	1.3.1	Functional System Administrators (FSA)	System application experts with administrative rights to amend security access of users and interface with vendor for system changes/support.
4	1.3.1.1	Build Security	A key role of the FSA is to ensure appropriate security access in the application by job function
4	1.3.1.2	Validate Security	The FSA will validate requested access is appropriate for business need
4	1.3.1.3	<i>Milestone:</i> Develop Training Materials	FSA, in collaboration with the vendor, develop KP specific training based on user role (e.g. SSR vs. Unit Manager vs. End User)
5	1.3.1.3.1	Brochures	Job Aids for application identified workflows (such as brochures) will be created by the FSA
5	1.3.1.3.2	Videos	Video Clips will be captured and utilized in the training curriculum
3	1.3.2	Managers	Managers of employees using the application will receive role-specific training.
4	1.3.2.1	Security Build	Managers of employees using the application will identify role-based security access rights required
4	1.3.2.2	Security Validation	Managers of employees using the application will validate the assigned security access rights are functional for the requirements of the job.
3	1.3.3	Support Service Representatives (SSR)	Employees working in the staffing offices providing the hospital functions of scheduling, staffing, and payroll
4	1.3.3.1	SSR Security Build	SSRs using the application will identify role-based security access rights required
4	1.3.3.2	SSR Security Validation	SSRs using the application will validate the assigned security access rights are functional for the requirements of the job.
3	1.3.4	End Users	Recipients of the application. End users will view schedules, request for days off/work via the application.
2	1.4	System Configuration	All files and records are updated to reflect the widget management system.
3	1.4.1	Department Discovery	Specific application build parameters by facility, service line and functional department. This includes items such as number of beds available, work requirements and certifications of staff in specific departments.

3	1.4.2	Go-Live Parameters	Identification of specific must-haves to determine the application is ready to become functional.
3	1.4.3	System Interfaces	Identification, build and testing designated interfaces between systems (e.g. Human Resources, KP TIME, Employee Health Services)
3	1.4.4	Standardization of Contracts	Identify specific contract(s) language and the intent of such language with labor relations and operational leadership across entities and irrespective if the employees are affected by the new application.
3	1.4.5	Schedule Configuration	System build by FSA to configure rotating schedules in 4 or more week patterns
2	1.5	System Validation	Validation of system build requirements to measure performance as intended.
3	1.5.1	User Acceptance Testing (UAT)	Users of the application build test the performance to validate performance as intended.
3	1.5.2	Mobile Worker/Manager Application	Validation that mobile features of the application perform as intended.
3	1.5.3	Mobile Device	Validation that mobile application functions as intended on mobile connected device.
2	1.6	<i>Milestone: Deployment</i>	Activation of technology
3	1.6.1	Planned migration from ANSOS to KP Schedule	Project plan provides actionable path for moving from legacy system to KP Schedule.
3	1.6.2	Go-Live Checklist Complete	Identified essential elements prior to activating the application are completed.
3	1.6.3	Go-Live for Scheduling	Scheduling for upcoming work schedule is being executed in the application. Scheduling in legacy system sunsets. Daily staffing continues in the legacy system.
3	1.6.4	<i>Milestone: Schedule published in KP Schedule</i>	Upcoming work schedule published to end users in new application.
4	1.6.4.1	On-Site Support	In person FSA support present in medical center during identified hours
3	1.6.5	<i>Milestone: Staffing Functionality Active</i>	KP Schedule being utilized for daily staffing of facility. Legacy system deactivated.

4	1.6.5.1	On-Site Support	In person FSA support present in medical center during identified hours
2	1.7	Post Deployment	Identification of support staff, structures, and processes put in place subsequent to the go-live activities.
3	1.7.1	Project Transition	Formal report and hand-off from vendor to organizational business owner

Appendix X

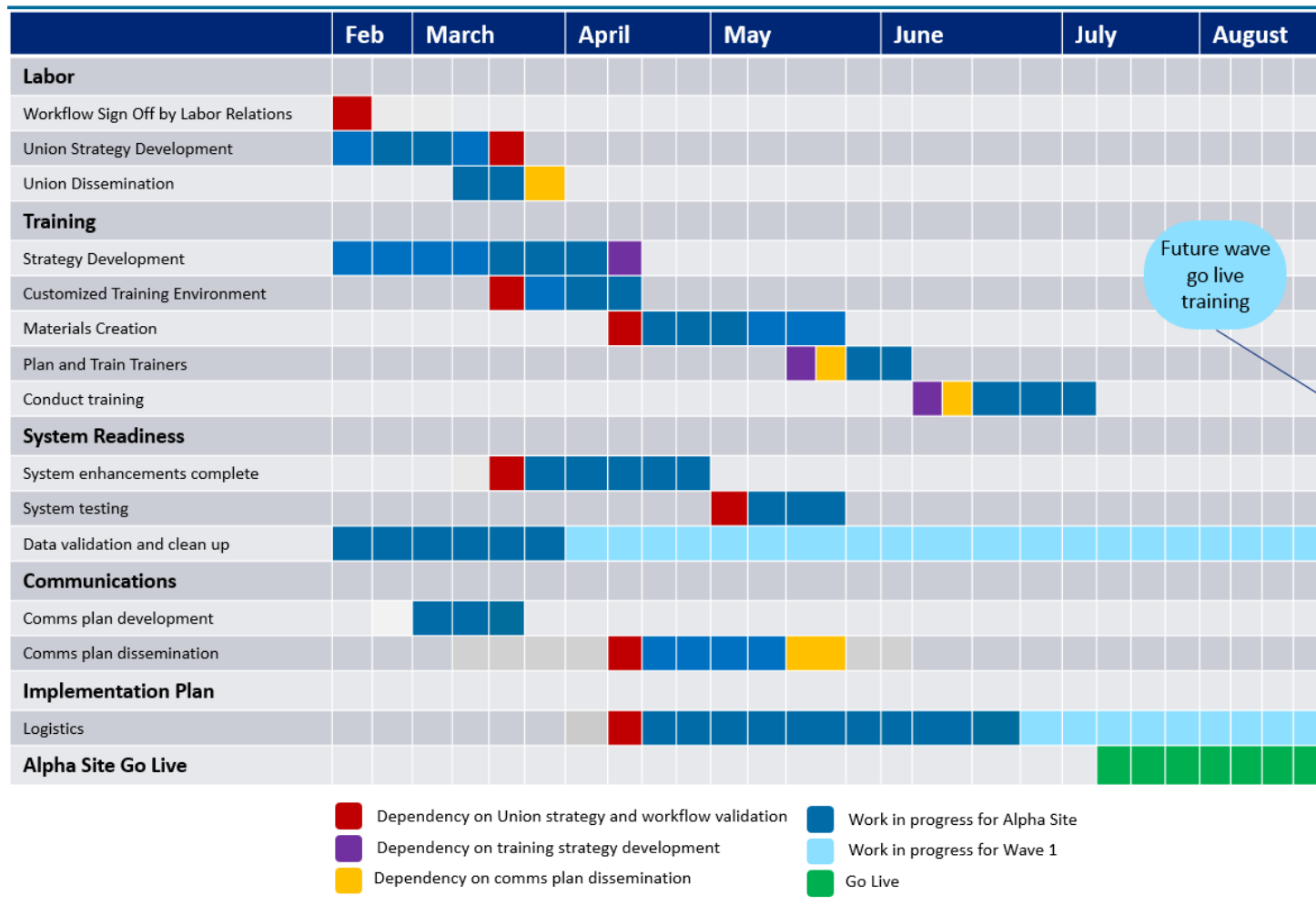
Role Matrix

Task	Lisa M	Bryan	Lidia	Heidi	Audrey	OE PM (Michelle)	Leadership (IT & Ops VPs)	KPIT (Chris / Maria)	ASG (Tina O'Brien)	Med Ctr Admin Svs Dir	IT Business Partner (Tyche Gage)	Labor Relations (Betty Sargent)	Communications (April Karys)	Decision Support (Wendy Lin)	ES&F	Finance (Linton White)	KP Insight	Procurement (Steve Barth)	Medical Center Acceptance Testing
Overall Project																			
Ensure the overall project is being driven forward	R/A		R/A	A	A	R/A	A	R/A	C	A		A	C	I					
Communication with Labor Relations	R/A		C	C		R/A	I	I	I			R/A	C	C					
Communication with other internal stakeholder (e.g. Learning & Development)	R/A			A				R (team dependent)	C	C		C	C						
Define work practices, policies, and workflows for standardized staffing office	R/A		R	C	C	R	A	I	I	I		A/C/I							
Connect the dots between the business and IT to gain the enterprise viewpoint											A								
Project charter and business case definition											A								
Development of a synchronized project plan which integrates both technical and business operational plans											A								
Assist team move through the IT Governance process											A								
Lessons from KPNW																			
Lead calls with KPNW for learning	R?A		R/A	A/C	A/C	I	I	C	C	C		I	C						
Reporting																			
Build Reports (where necessary)	R/A	R/A	R/A	C	C	I	C	C	I	I		C	I	R	C	C	C	C	C
Identify Out of the Box Reports		R/A	A	A	A				I			C	I	R	C	C	C	C	C
API																			
Lead contact point for API	R/A		C	C	C			A	A									A	
Liaison for developing interfaces (API & KP groups)	A		C	C	C			R/A	C	A									
Liaison for system configuration	I		R/A	C/I	C/I			I	C	I									
Lead contract re-negotiations	A/I					R/C	I	R										A	
Decision to Go Live	R/A	A/C	A/C	A/C	A/C	A/C	A	C	C	I									
Testing																			
System Integration Testing (Configuration, Interfaces, Security Roles)	R/A	A/C	A/C	A/C	A/C			C/A	C	R									A
Training																			
Develop Training Strategy	R/A	C	A/C	R/A	C	R		C/I	C/I										
Training Environment Customization	R/A	C	A/C	R/A	C	R		I	I										
Ensuring Trainer Resources (tools)	R/A	A	C	A	C	R		C	C										
Communication with facilities & training logistics	R/A		A/C	A/C	A/C	R													
Deliver Training	R/A	A	A	A	A	C													
Rollout																			
Develop rollout strategy	R/A	A/C/I	A/C/I	C/I	C/I			C	C										
Develop Cutover Plan moving from ANSOS to KP																			
Schedule and Checklist	R/A	A/C	A/C	A/C	A/C			C	R										
Deployment & Post Rollout Support																			
Operational Support (people)	R/A		A	A	A	I	R		R/A										
Technical Support	A	R/A	C/C/I	C/C/I	C/C/I			C/A	R/A	A									
Post Go Live Evaluation - Performance Metrics																			
	R/A	A	A	A	A	C/A			A										
Post Go Live Training																			
	R/A	R	R	R	R	C													
Black	Filled out as a team																		
Red	FSA																		
Blue	IT PM (Chris)																		
Purple	ASG (Tina)																		
Green	OE PM (Eric)																		
Gold	Lisa																		
Light Green	Maria/IT																		

Appendix Y

Gantt Chart

Timeline Alpha Site Go-Live: July 2017



Appendix Z

GO LIVE CHECK LIST - STAFFING OFFICE

1. Data Entry

- Enter Seniority Tie Breakers
- Enter Unit orientation licenses
- Enter outstanding schedule rotations
- Enter Long Term Requests (pre-approved vacation, etc.)
- Create My Totals
- Create Schedule Groups

2. Check & Verify

- Employee licensure for required licenses
- Confirm rotating schedules are correct (especially <2 week rotation)
- Employees who are involved in "long term" shift trades need to be informed that their trade will no longer be processed automatically
- Employees who have "long term" schedule changes in their schedule pattern will need to be updated to reflect the employee's posted schedule pattern. Notify employees of schedule change.

July 2 - 8: Prior to Staffing Go Live

- Weekend and consecutive day data from ANSOS for previous staffing week. Update in KPS as appropriate.

3. Reports & Printouts

- Printed phone lists (consider scheduling for keeping data updated)
- Printed seniority lists (consider scheduling for keeping data updated)
- Print/Archive schedules (this will be done part of "regular" workflow)
- Identify and create report favorites

4. Operational Transition

- 5.26.17** - Remove ANSOS function access to Scheduler. - **SSF & SRF COMPLETE!**

Figure 1. Staffing Office Checklist

GO LIVE CHECK LIST - DEPARTMENT MANAGERS

1. Department Setup

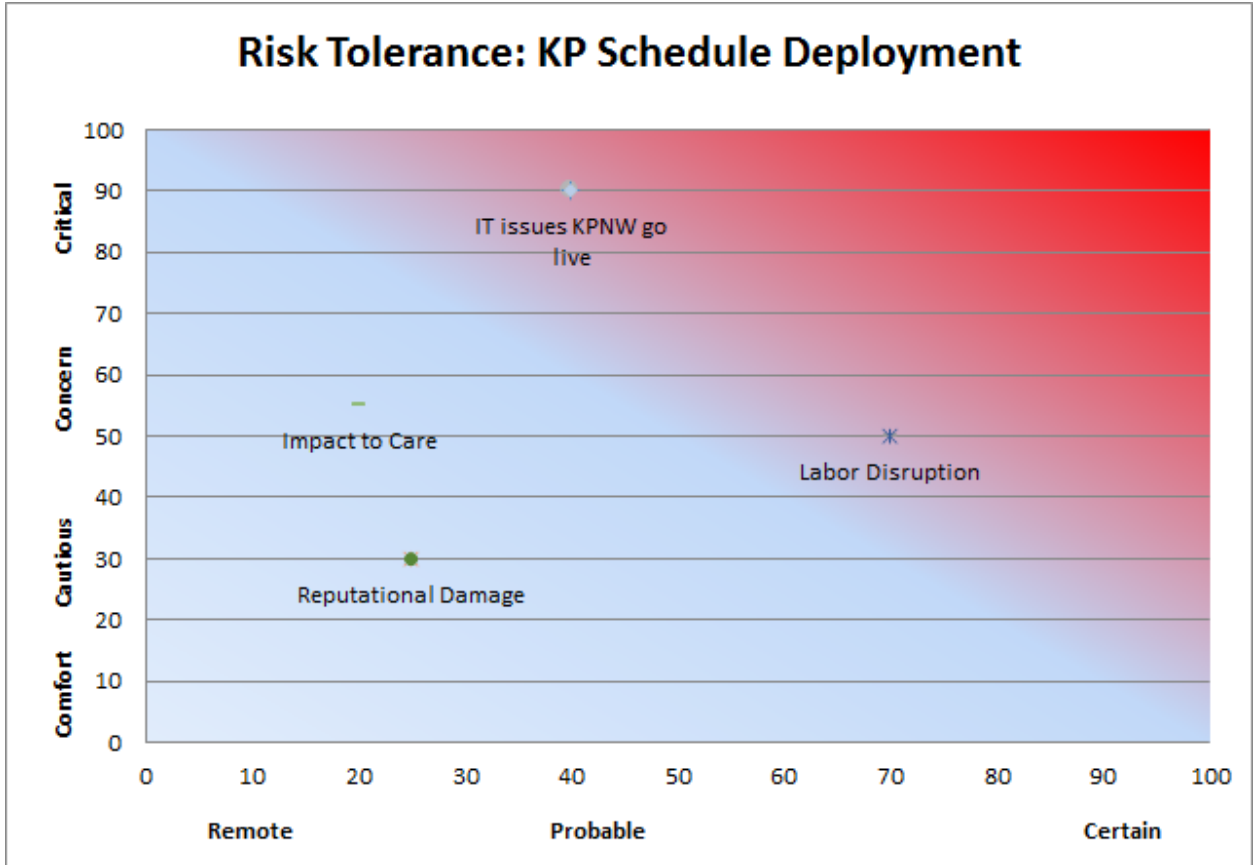
- Check Position License requirements
- Check Profiles
- Check Activity Codes
- Check stations (if applicable)
- Enter Staffing / Core Staffing Template
- Validate department license requirements
- Annual needs (such as a once a year report)

2. Employee Data

- Validate employee demographics - Shift, FTE, & Length of shift
- Check that all employees have required licenses
- Validate employees are in the correct Profile
- Check stations (if applicable)
- Identify EEs from other facilities who work in their department
- Ensure employees know their Windows Password
- Ensure employees know their Lotus Notes Password
- Mobile Device Communication - encourage employees to sign up for Open Shift Notifications

Figure 2. Nursing Departmental Manager Checklist

Appendix AA

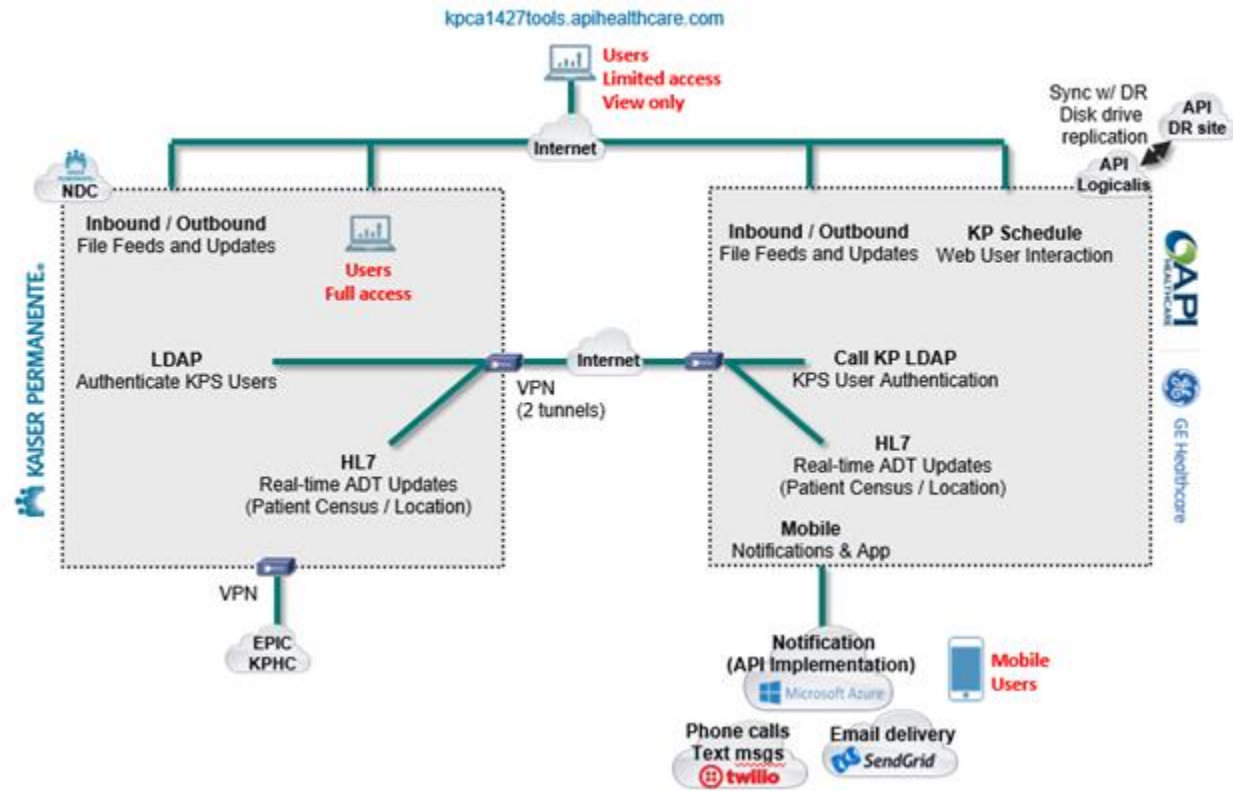


Risk Tolerance

Appendix AB

KP Schedule: E2E Infrastructure Overview

KAISER PERMANENTE



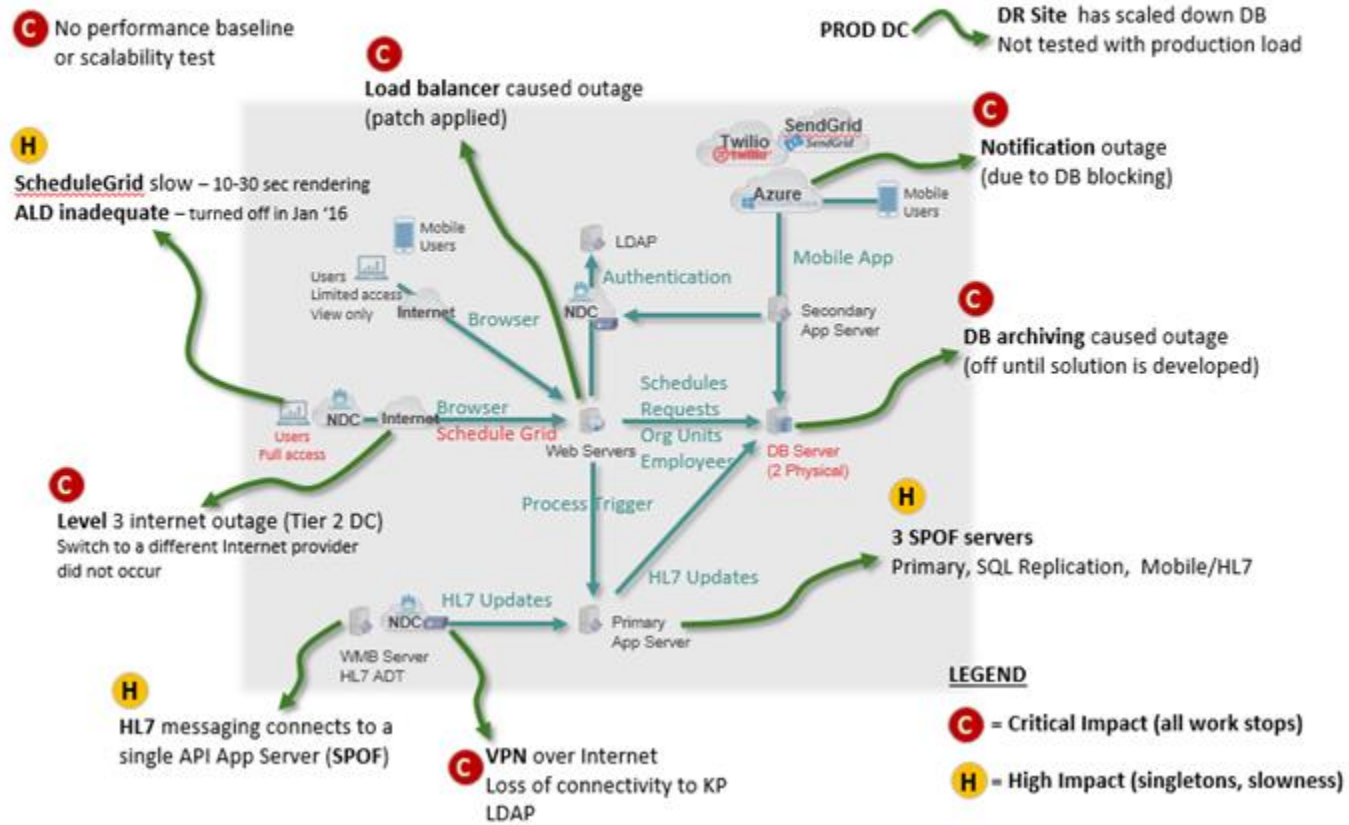
End to End Infrastructure

Appendix AC

KP Schedule - Critical and High Issues Identified for Real-time Nurse Staff Scheduling

Kaiser Permanente

Numerous issues are spread across multiple solution components



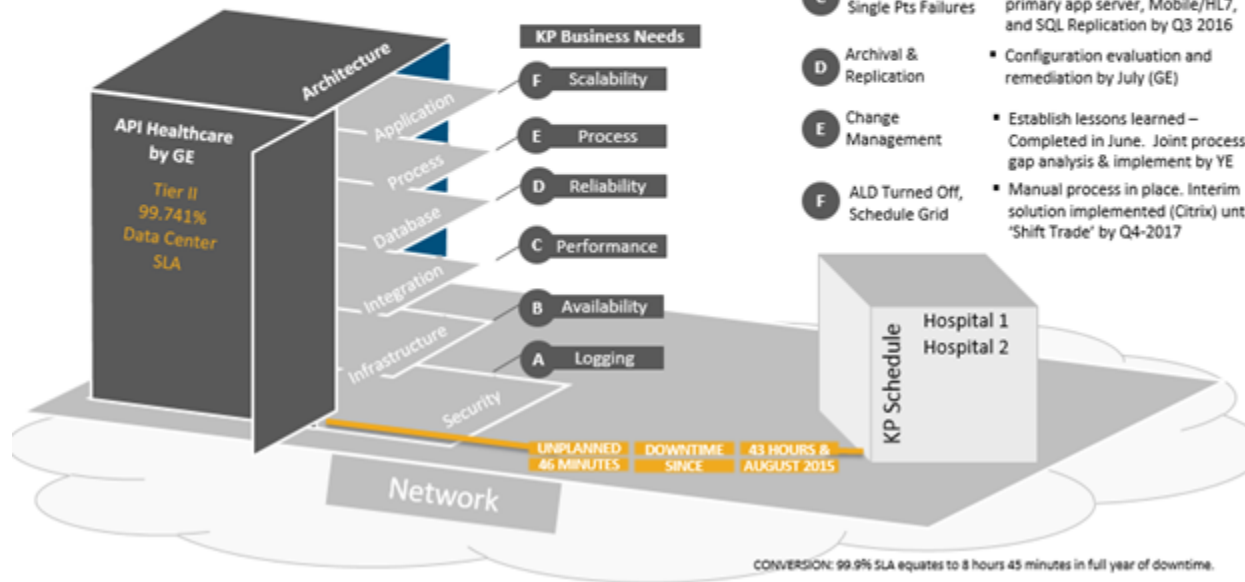
Critical and High Issue Identification

Appendix AD

What will it take for the KP NW Region to go Green?

Kaiser Permanente

Run at or above 99.9% SLA through YE 2016.
 Today, KP Schedule availability needs improvement due to many issues. Joint recommendation by GE and KP commits to changes in design and monitoring.



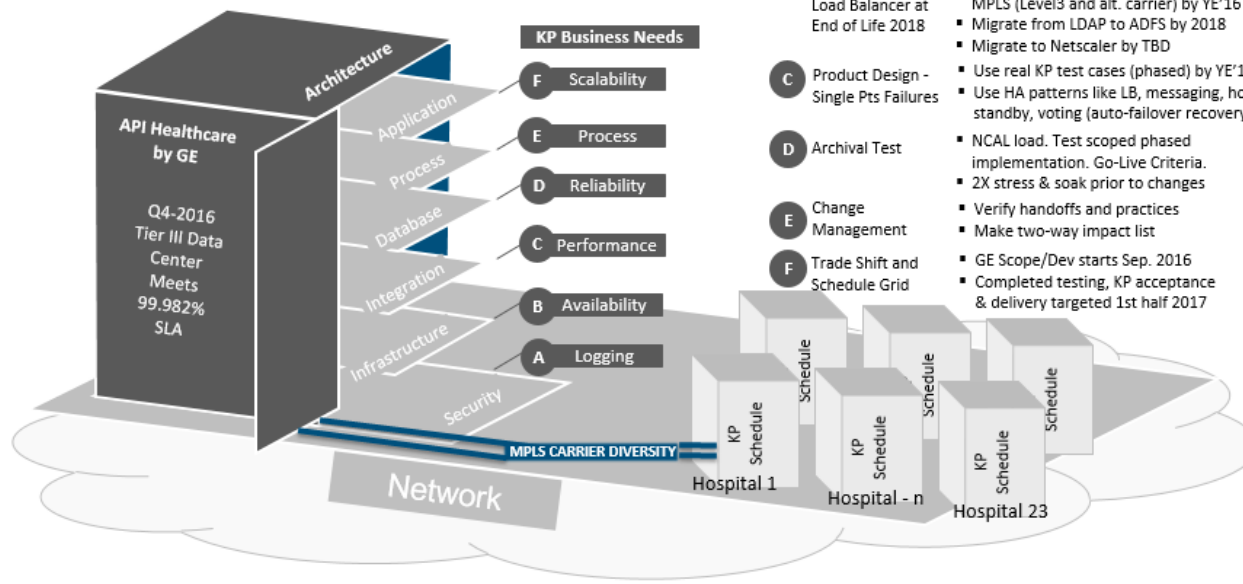
KPNW Go to Green

Appendix AE

What changes can make solution scale to the size of NCAL Region and beyond?

Kaiser Permanente

KP Schedule must scale 10-13X flawlessly:
 From 2,000 to 27,000 employees and beyond
 From 30 to 300 schedulers and beyond
 From 2 to 23 hospitals and beyond



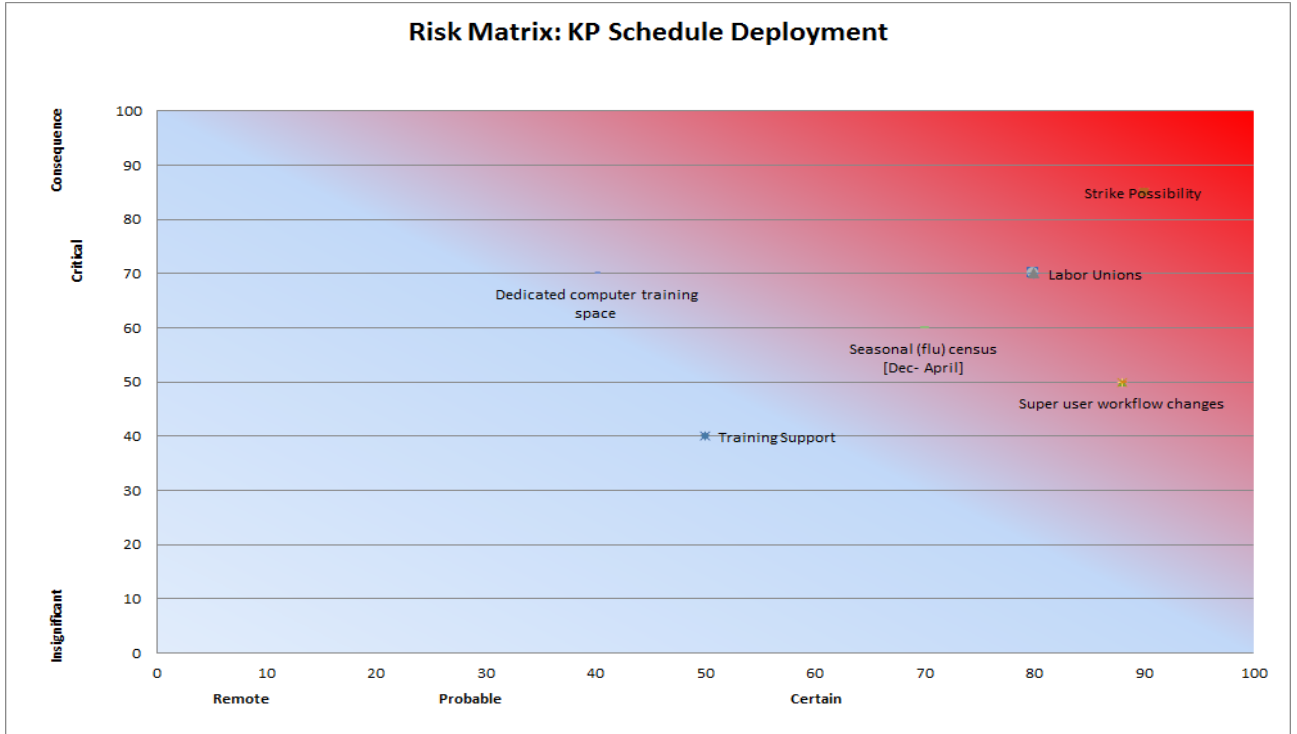
Solution Scalability for NCAL

Appendix AF



SWOT Analysis

Appendix AG



Inherent Risk Matrix

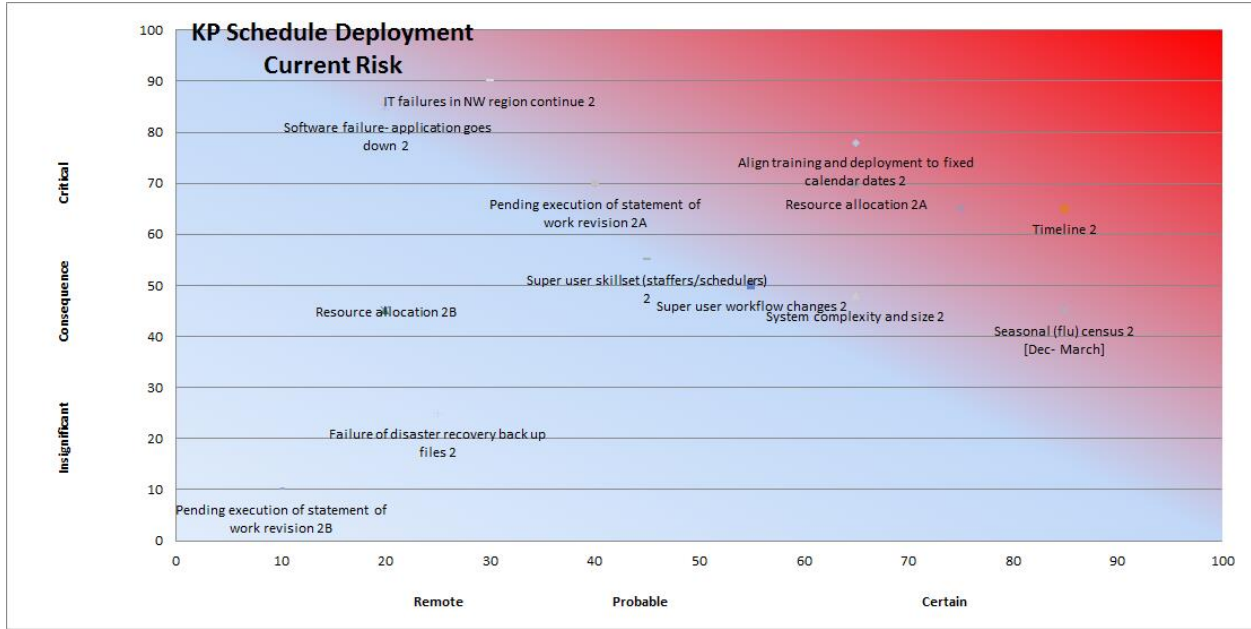
Appendix AH

Risk Assessment & Mitigation

Risk Assessment and Mitigation: KP Schedule Deployment				
	Source & Type of Risk	Services	Impact	Mitigation
People	Timeline Strategic Risk	compression by leadership to finalize deployment before nursing contract expiration (August 2017)	Application build and deployment resources need increases Delay past November adds 2-3 months	Transfer: Leverage local infrastructure (Staffing Office Manager & IT Site Support) for deployment
	Resource allocation Operational Risk	limited resources to customize application to medical center, train, and support go-live	Use off the shelf training; training environment will not exactly match live environment Delay in roll out	Tolerate: Use off the shelf training Transfer: repurpose staffing office manager peer group for design build Transfer: Pull local staffing office manager from typical work for 5 months
	Resource allocation Operational Risk	Loss of IT project manager	Navigation of IT infrastructure issues and IT contractual needs	Transfer: new resources identified
	Labor Unions Tactical Risk	Communication & engagement (notice at 90 days & 30 days)	Possible deployment delay due to multiple requests for information Possible delay in deployment due to protracted bargaining Possible unfair labor practice (ULP) charge	Treat: Engage corporate communications in planned notices Treat: Engage represented staff in sandbox demonstrations at alpha sites once notice given Tolerate: Ensure adequate notice given and prepare for ULP charge
	Super user skillset (staffers/schedulers) Operational Risk	Daily hospital scheduling & staffing	Quality and safety of care Legal and regulatory compliance Reputational damage	Treat: Functional system administrators on site with go-live Transfer: train existing Staffing Office Managers to support end users & have regional support on call
	Super user workflow changes Operational Risk	Standardized contract interpretation	May change workflows where practice drift has occurred	Treat: Job aides (pocket guides, computer based training, just in time clips) Transfer: train existing Staffing Office Managers to support end users & have regional support on call
Premises	Dedicated computer training space Tactical Risk	Web-based computer training	Multiple training sessions due to space constraints	Treat: book rooms now for 2017 dates Tolerate: Provide on site support and utilize wireless carts on wheels as needed
Processes	Seasonal (flu) census [Dec- March]- Operational Risk	Hospital census increases in fall/winter and thus need additional staff to work	Increased volume may lead to unfilled shifts New application and increased workload may lead to errors in booking shifts (grievance potential, cost liability)	Treat: coordinate tight winter census planning Tolerate: selected alpha sites have not historically experienced wide census fluctuations
	Pending execution of statement of work revision Tactical Risk	Customization of training environment to match look & feel of end product	Delay in roll out to customize End product may not match generic training environment and thus contribute to errors Dissatisfaction of end users	Tolerate: Utilize out of box training with out customization & train Staffing Office Managers on differences
	Pending execution of statement of work revision Tactical Risk	Correction to termination date in application	employees may not appear in the application on last day of work	Treat: change order with vendor to +1 day to termination date
	Align training and deployment to fixed calendar dates Tactical Risk	Employee work schedule publishes on a fixed day each month Training must sync with schedule cadence	Delay in deployment on schedule Need to bring more medical centers on live at one time to meet deployment end date	Tolerate: slippage of final deployment date Treat: elicit KPNW support in go-live efforts
	System complexity and size Tactical Risk	End user satisfaction	Reputational damage if roll out is not smooth	Treat: Engage represented staff in sandbox
Products	Software failure-application goes down Operational Risk	Inability to utilize application	Inability to utilize scheduling or staffing features Inability of end users to utilize self-service features	Transfer: well defined disaster recovery time frames in contract Treat: IT architecture group engagement to solution KPNW down-time occurrences Treat: Load testing of data imports prior
	Failure of disaster recovery back up files Operational Risk	Inability to utilize application	Operational/Patient Safety	Treat: job aids Treat: procedures and training on down time processes
	IT failures in NW region continue Operational Risk	Failure to address root cause	Unreliable application Quality and safety of care Legal and regulatory compliance Reputational risk	Treat: IT Architecture group work with API to define root causes Terminate: Executive decision to delay or pull project

adapted from Hopkin, P. (2014).

Appendix AI



KP Schedule Deployment Risk with Mitigation Strategies

Appendix AJ

Stakeholder Perceived and Latent Needs

Stakeholder	Perceived need	Latent need
Regional President	Gain efficiencies from standardized workflows; leverage rules-based logic	Explore if standardization might yield ability to centralize operations for entire region
Regional Vice President, Nursing & Clinical Integration	Current technology application is antiquated	Need a system that will be nimble; bias against GE Healthcare
Regional Vice President, Nursing & Clinical Integration	Decreased use of agency RN/travel nurses	Belief that decreased reliance on contingent workforce may impact patient satisfaction scores, quality and safety of care delivery
Regional Vice President, Finance	Decrease use of overtime	Address impact of cost drivers of nursing workforce
Regional Vice President, IT	Desire for IT to partner with operations to support clinicians	New opportunity for IT VP- newly responsible for both IT and internal consulting group
Regional Vice President, IT	Cloud-based; no need to invest in servers	Model for future to not have on premise servers
Labor Relations	Rules-based application of contract language for decreased grievances	Desire for standardization of all workflows across the system (not limited to where contract language is present)
Operational Leadership	Standardized coding convention	Facilitates regional data analytics; supports centralized staffing office consideration for future
Operational Leadership	Fatigue mitigation: Leverage workforce flexibility for extra shifts at non-premium pay	Technology use for Uber-like view of who is available near by; decrease premium pay expense
End-user/Represented staff	Real-time processing of needs	Transparency of schedule and change requests
End-user/Represented staff	Mobility of access	Convenience
End-user/Represented staff	Self-service functions improve response time to requests	Control over work life
KP IT	Free dependence on local servers	Hosted environment may mean less work
KP IT	Availability of application Back up servers outside of CA earthquake area	Shift liability for disaster recovery and usability to vendor
adapted from Meyer & Crane (2014, figure 3.2)		

Appendix AK

Demand-based Staffing



Technology Enabled: Provide the right tools, used in the right way, to enhance quality and service.

KP Needs to Update 30 year old Staffing & Acuity Systems

- Replacing ANSOS with API’s scheduling module (branded KP Schedule) is calculated to yield **\$135 M** in hard benefits and \$1.6M in soft benefits from 2017 – 2025. Benefits include improved leveraging qualified staff at non-premium pay thus reducing staff fatigue. Evidence supports fatigue reduction which improves quality care delivery and employee safety.
- KP Schedule leverages state-of-the-art technology to advance efficient and effective staffing for safe patient outcomes, workforce flexibility, and staff satisfaction.

Benefits



Affordability
<input type="checkbox"/> Reduction in overtime
<input type="checkbox"/> Discontinue ATHOC 3 rd party notification system
<input type="checkbox"/> Shift differential
<input type="checkbox"/> Remediate FTE disparities
<input type="checkbox"/> Eliminate ANSOS production cost

Quality & Service
<input type="checkbox"/> Fatigue mitigation
<input type="checkbox"/> Improved patient safety
<input type="checkbox"/> Reduced workplace injury
<input type="checkbox"/> Self-service features enhance satisfaction

Expected Outcomes

- Enhanced Productivity**
- Increased Effectiveness**
- High Quality Care**
- Flexible Staffing Models**



- High risk of system failure
- Variation in staffing office practices
- Staffing inefficiencies



- ✓ Robust workforce management capabilities
- ✓ Flexibility, transparency, and integration
- ✓ Less labor intensive to operate

Demand-based Staffing Logic Model

Appendix AL

Demand Based Staffing: Right caregiver in the right place at the right time.

Why change our hospital scheduling & staffing system?



It is antiquated!

- 31-year old DOS-based legacy system
- Manual processes; no interfaces
- Practices have drifted
- Risk of erroneous pay practices



Technological advances

- Web-based
- Smart phone app mobility
- Self-service features



Improving safe care delivery

- Rules-based logic aids in executing complex tasks
- Workforce flexibility to provide added supply
- Limit excessive shifts & reduce caregiver fatigue
 - Reduce harm to patients and staff

Appendix AM

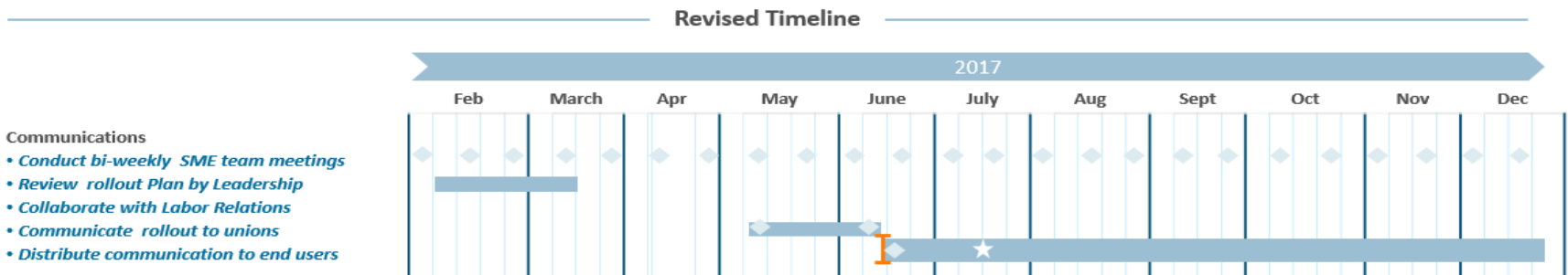
Take-away Messages

Audience Segmentation	Barriers to full support	Benefits	Compelling points
<p>Corporate leadership *Regional President *Regional Vice-Presidents</p>	<ul style="list-style-type: none"> * Technology performance issues in Northwest region * May need to engage in developer relationship with vendor * VP bias against GE Healthcare * Timing of nursing contract expiration (bargaining/strike) 	<ul style="list-style-type: none"> * Focus on quality and safety * Ability to address fatigue mitigation * May decrease contingent use * May decrease cost in premium pay * We've engaged in developer relationships in the past (epic/KP HealthConnect) 	<ol style="list-style-type: none"> 1. We will lead the healthcare industry leveraging state of the art technology to keep our patients and employees safe. 2. We will design the future of excellence in hospital staffing to meet our corporate mission. 3. Technology enabled tools will help us to better connect with our workforce, promote safety, and efficiency.
<p>Front-line end-users *Principally RNs *Unlicensed Assistive Personnel * Support Service Representatives (Staffers/Schedulers/Payroll) *Secretarial Support *Para -professionals</p>	<ul style="list-style-type: none"> * Bargaining is required * Change just before contract expiration may be used as a disruption * It is change * Age of workforce and technology aptitude 	<ul style="list-style-type: none"> * Convenience; no standing in line at staffing offices *Portability/mobility *Self-service features *Visibility of opportunities * Integrated call system eliminates existing third-party (At HOC) call system * Flexible work (gig economy) *Data feeds from HR/TIME eliminate manual entry 	<ol style="list-style-type: none"> 1. KP Schedule is available to me anywhere, anytime. 2. Going green: Taking the paper out of the process. 3. Data feeds help save time.
<p>Regional Roll-out Support * Labor Relations * Human Resources * KP-Information Technology (KPIT) *Corporate Communications</p>	<ul style="list-style-type: none"> * Technology performance issues in Northwest region * No history in the prior work around vendor assessment/selection * No experience/understanding of hospital staffing * No working history with current operational leaders * Competing priorities for labor relations (bargaining year) 	<ul style="list-style-type: none"> * Large group with multiple areas of expertise to be leveraged * Desire to add value to operations * Analytical logical thinkers * Experience with large-scale deployment of electronic medical record 	<ol style="list-style-type: none"> 1. Our partnership with Epic positively influenced the nation; we will do the same in the demand-based staffing niche. 2. We are confident that selected the best vendor and forged the best relationship to meet the goals for service to our members today and into the future.
<p><i>adapted from W.K. Kellogg Foundation (2006)</i></p>			

Appendix AN

Communication: Overview

Labor Relations will be engaged to communicate API rollout to relevant unions before distributing messaging to end users



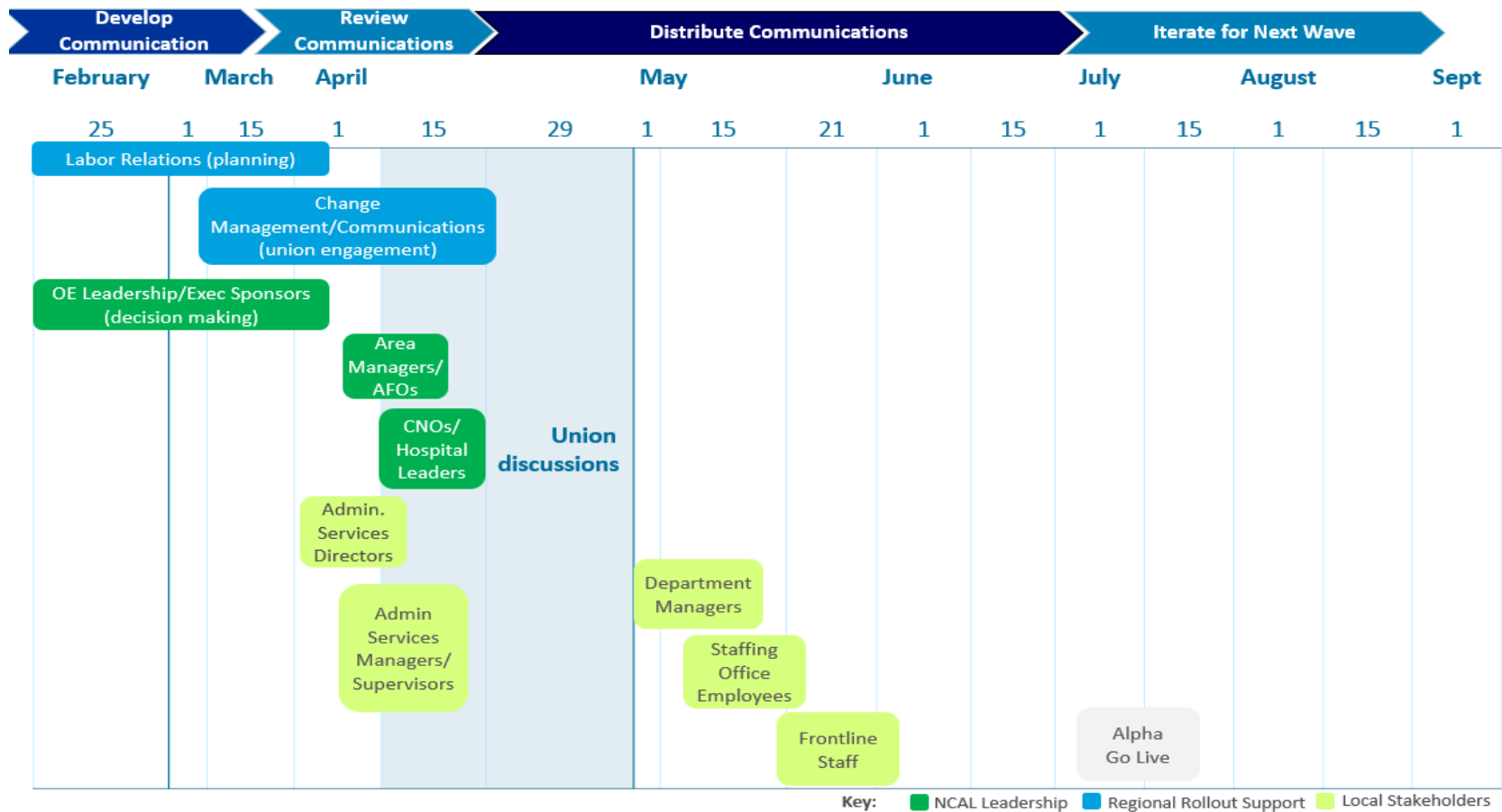
*Please refer to line item:

Key: Union Communication Messaging Training Milestone

Appendix AO

Communication: Timeline and Cascades

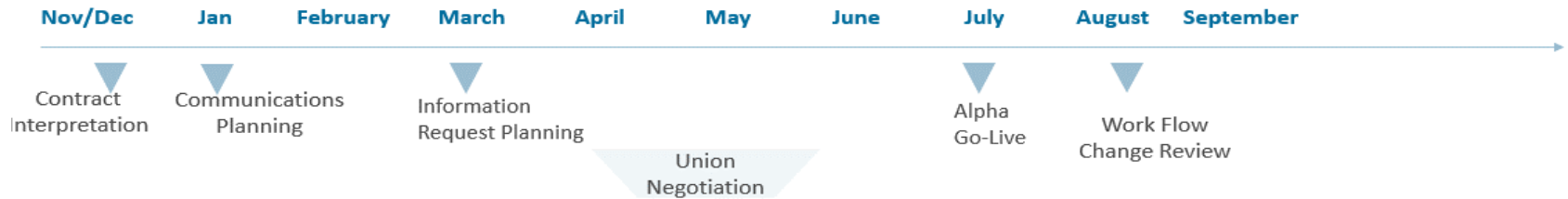
A communication plan cascaded across the region to better engage stakeholders



Appendix AP

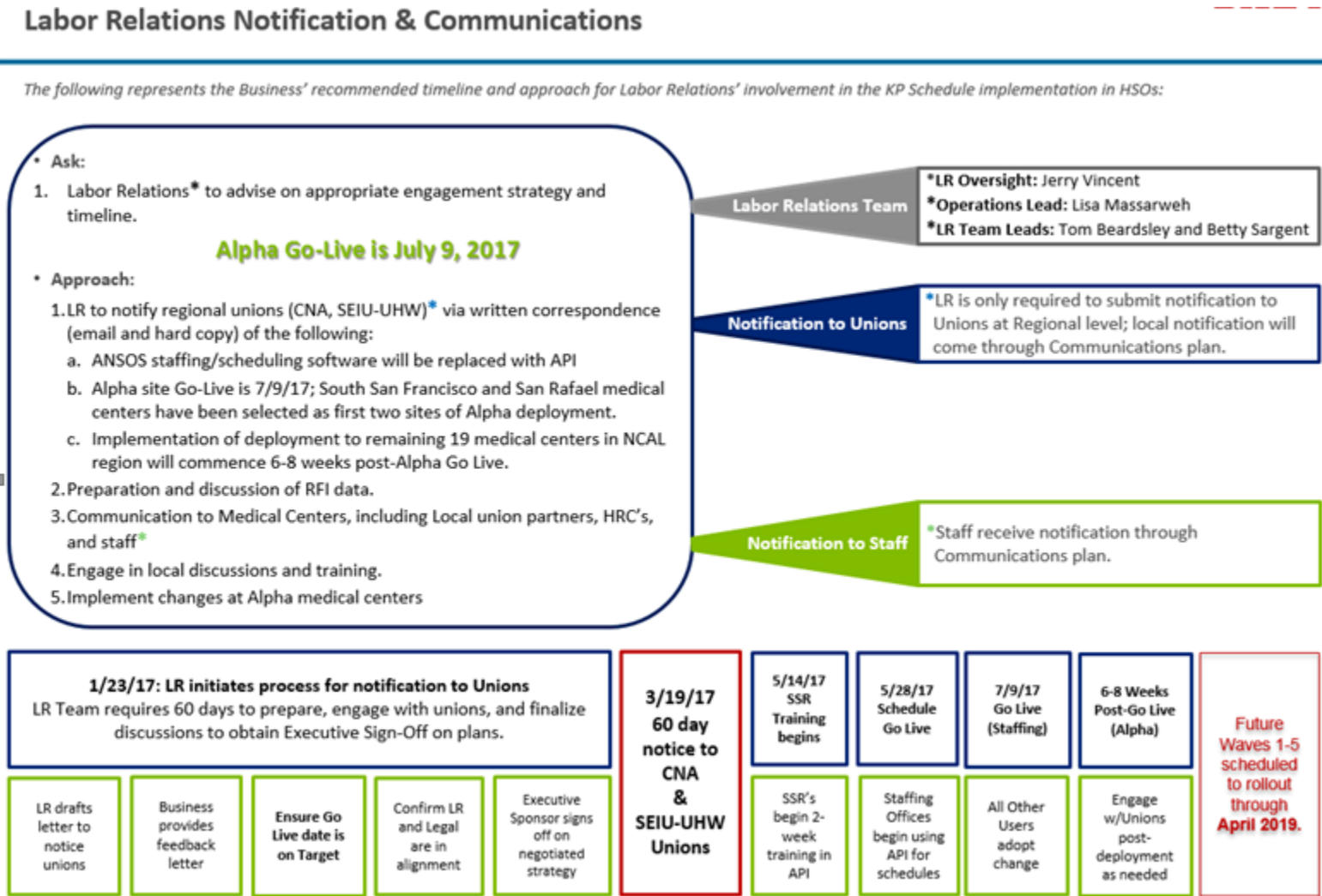
Labor Relations Communication Overview

The following is the recommended structured approach with Labor Relations to facilitate stakeholder communication:



No.	Meeting Topic	Discussion Items
1	Contract Interpretation (Questions and Dialog & Sign off)	<ul style="list-style-type: none"> Discuss list of questions about current variance in contract interpretation across sites Sign off contract interpretation by labor relations and operations (Hospital, Med Group, & Continuum)
2	Communications Planning	<ul style="list-style-type: none"> Finalize communications timeline and forums to engage and inform relevant stakeholder groups, including unions, super users and end users of KP Schedule Validate leadership approval process for all communications
3	Prepare for information requests from organized labor	<ul style="list-style-type: none"> Anticipate questions items of potential information requests from organized labor
4	Alpha Site Go-Live	<ul style="list-style-type: none"> On site support (operational, technical, communications)
5	Work Flow Change Review	<ul style="list-style-type: none"> Review future state work flows and changes to roles compared to current state Develop risk mitigation plan for high-risk work flow changes

Appendix AQ



Appendix AR

2017 KP SCHEDULE COMMUNICATIONS CAMPAIGN**Background**

Starting in July 2017, Kaiser Permanente Northern California will launch KP Schedule, a new hospital scheduling and staffing application. This region is the second to receive KP Schedule, which has been fully deployed in our Northwest Region since 2016. KP Schedule will launch initially at two Northern California sites. Applicable unions will be notified in March, in advance of staff training that is scheduled to begin in May.

KP Schedule is provided by GE Healthcare, which purchased API Healthcare in 2014; the scheduling software often is referred to simply as “API” or “GE.” However, KP has chosen to call its authorized “build” of this software KP Schedule.

This solution will replace the DOS-based scheduling software (ANSOS) that has been in use since 1986, can no longer keep pace with other KP data systems, and does not provide modern convenience. For example, ANSOS does not interface with KP TIME; all codes in ANSOS have been exhausted, which limits system upgrades or compatibility with new TIME codes; employees are not able to accept shifts or check their schedules online. KP Schedule, on the other hand, offers a multiplatform solution. The web-based system lets users see schedules in real time using their desktop computer or mobile device. Users will be able to request time off, see available shifts, immediately update information, quickly respond to a variety of staffing requests, and more.

Replacing ANSOS with KP Schedule in Northern California is projected to result in cost savings to Kaiser Permanente through reduction in overtime, discontinuation of the AtHoc third-party text notification system, elimination of ANSOS production costs, and more. There are “soft benefits” as well: These include the ability to reduce staff fatigue through the ability to schedule qualified staff more efficiently, which can result in safer patient care.

KP Schedule will be rolled out to our hospitals in Northern California in waves, beginning with South San Francisco and San Rafael medical centers and continuing until all employees now scheduled in ANSOS are moved to KP Schedule. Deployment is expected to be completed by April 15, 2019. It is expected that there will be no disruption to patient care or hospital services during the transition from ANSOS to KP Schedule.

KP Schedule represents simply a change in staffing and scheduling application. There is a requirement to notify the unions of those represented employees who will be moved to the new software, and we will meet and confer if the unions request. These unions are: California Nurses Association and SEIU-UHW Local 29. (Please see Appendix A for full list of employee groups that will be scheduled using KP Schedule upon full implementation of this application.)

Please note: KP Northern California also is exploring the possibility of eventually moving from its current patient acuity application, called GRASP®, to another application. Because this exploration is ongoing, and sensitive in terms of labor relations, the replacement of GRASP® is not a part of this communications campaign.

Communication Goals

- Use compelling messaging to engage affected employees, help assuage change-related anxiety, and maintain/increase trust in KP as an employer
- Explain the reason behind the switch from ANSOS to KP Schedule and the benefits of the new system using clear, simple terms.
- Inform staffing office leaders, nurse and hospital managers, and employees about the deployment and how it will affect their operations.
- Support Labor Relations in its engagement with unions around the deployment of KP Schedule for hospital scheduling, any changes to staffing office employee workflows, etc.
- Work with Patient Care Services, Operational Excellence, and Media Relations as needed, to ensure messaging is accurate, is distributed efficiently, and any media inquiries are managed appropriately.
- Keep all stakeholders and audience members informed about developments in the KP Schedule deployment.
- Pre-empt and counter union attacks whenever relevant and appropriate.

Communication Objectives

- Align as appropriate with the 2017-2018 integrated nurse engagement communications plan for Northern California. Coordinate KP Schedule communications with those of the greater nurse engagement campaign as well as with the 2017 CNA Contract Bargaining campaign to ensure appropriate timing of tactics for each initiative and to avoid message clash or fatigue.
- Inform leaders, managers, and key stakeholders. Use multiple channels to provide concise, informative communications that enable leaders and managers to educate their workforce.
- Support the KP brand. Educate nurses, employees, physicians, and other stakeholders about the change to KP Schedule for scheduling and staffing, provide necessary communications tools and information about training, and inoculate them against potential union misinformation. Distribute correct information internally and externally to counter any distorted or incorrect messages disseminated by unions.

Campaign Timeline

- March 2017 through April 2019 (See Appendix B, Key Implementation Dates)

Target Audiences

- Regional KFH/HP leaders (plus TPMG and Continuum leaders as a courtesy)
- Nurse leaders
- Front line hospital nurses
- Managers of employees whose staffing and scheduling will move from ANSOS to KP Schedule
- Other employees whose staffing and scheduling will move from ANSOS to KP Schedule

- Staffing office leaders
- Staffing office employees

Messages

1. Overarching Messages

- We are pleased to announce that a new web-based system for scheduling hospital nurse staffing will be coming to Kaiser Permanente.
- This new system, called KP Schedule, will allow us to use today’s technology — web, desk/laptop computers, and personal mobile devices — to greatly improve the scheduling experience for users and managers.
- KP Schedule will enhance the way employees choose or are scheduled for shifts in alignment with their collective bargaining agreements, and the way we manage requests for time off, additional shifts, and so on.
- We are pleased to be able to provide our employees with the many enhancements this change will bring, including improved transparency, efficiency, and convenience.

2. Key Supporting Messages

- The current ANSOS system, which has been in use region-wide for more than 30 years, is antiquated and is not able to keep pace with other KP data systems. For example, all codes in ANSOS have been exhausted, which limits system upgrades or compatibility with new TIME codes.
- The new KP Schedule system will let users see schedules online, quickly update information, and swiftly respond to a variety of staffing requests.
- Employees will be able to view their information – including shifts, on-call and calendar requests, on their computers or mobile devices. They can view requests to work and pick up shifts that are convenient for them, submit vacation and other time-off requests, and even track licensure and associated expiration dates. * (footnote: *it is employees’ responsibility to ensure they are compliant with required licenses.)
- KP Schedule will be launched in Northern California starting at South San Francisco Medical and San Rafael medical centers in July 2017.
- We do not expect any disruption to patient care or hospital services during the transition from ANSOS to KP Schedule.
- Training and additional information on how to use the new system will be provided closer to implementation for support service representatives, managers, hospital nurses, patient care technicians, and other appropriate staff.

Benefits of the new system

- Employees will no longer have to stand in line at staffing offices.
- Employees can rapidly request and respond to scheduling changes.

- The new, web-based system is convenient – employees can log on from work or home using a computer or smart mobile device.
- An automated call feature within KP Schedule will eliminate the need for a third-party (At HOC) text system.

3. Messages about Staffing Office Changes

- Staffing Office manager training will begin April 3; Staffing Office employee training in the new system will begin May 14, approximately 8 weeks prior to KP Schedule’s Alpha site launch. Training for all other users will begin approximately 2 weeks before each site launch.

4. Messages Specific to Potential Union Tactics

- Kaiser Permanente is designing its KP Schedule deployment to adhere to the contract agreements between the unions of affected employees and KP.

Tactics

1. Preparation and support for leaders

- Advance notice of communications to nurses, staffing office employees, other employees to be moved from ANSOS to KP Schedule.
- Talking points for leaders

2. Preparation and support for managers

- Message training
- Advance notice of messages with accompanying materials (fliers, FAQs, talking points, huddle messages, etc.)

3. Direct communication with end users

- Messages to be emailed, mailed to homes, or distributed by managers, as appropriate
- Periodic updates (emailed, mailed, or manager-distributed) on deployment, training opportunities, and so on
- *For the Record* website updates, if/when appropriate

Tactics & Deliverables

Tactic	Audience(s)	Owner	Timing	Notes
1. Advance notice to leadership	NCRLT and NCOM; copies to CNEs, COOs	Corp. Comm.	Tues., 4/4	Advance notice to be sent in advance of messages to managers or employees.
2. Message distribution to staffing office employees (training information, updates)	Staffing office personnel	Corp. Comm.	Wk. of 4/16	<ul style="list-style-type: none"> • These can be mailed if desired; alternatively, they can be emailed or sent by way of managers. • A distribution list will be needed if this channel is chosen.
3. Message to managers of employees moving from ANSOS to KP Schedule (Adv. Notice)	Managers of employees moving from ANSOS to KP Schedule.	Corp. Comm.	Mon., 4/24	<ul style="list-style-type: none"> • A distribution list will be needed to capture managers/directors of the employee group. • Materials will be attached to email for managers to post, distribute, and use when fielding questions
Huddle Messages (when needed)	Managers who conduct huddles and their teams			
Fliers	Employees moving from ANSOS to KP Schedule for staffing and scheduling			
Talking Points	Leaders, managers, employees			
FAQs	Employees moving to KP Schedule, staffing office employees			
4. Message distributions (announcement, updates) to employees moving to KP Schedule from ANSOS	Employees who are moving to KP Schedule from ANSOS	Corp. Comm.	Wk. of 5/28	<ul style="list-style-type: none"> • Distribution will be by direct email for employees who use Lotus Notes email, and by letter mailing or through managers for those employees who do not have access to Lotus Notes.
5. Reminders to affected staff prior to start of training on KP Schedule	Employees moving to KP Schedule from ANSOS	Corp. Comm	Wk. of 6/11	
6. Go-Live announcement	Employees moving to KP Schedule from ANSOS	Corp. Comm	3-5 days before go-live date	

Appendix AS

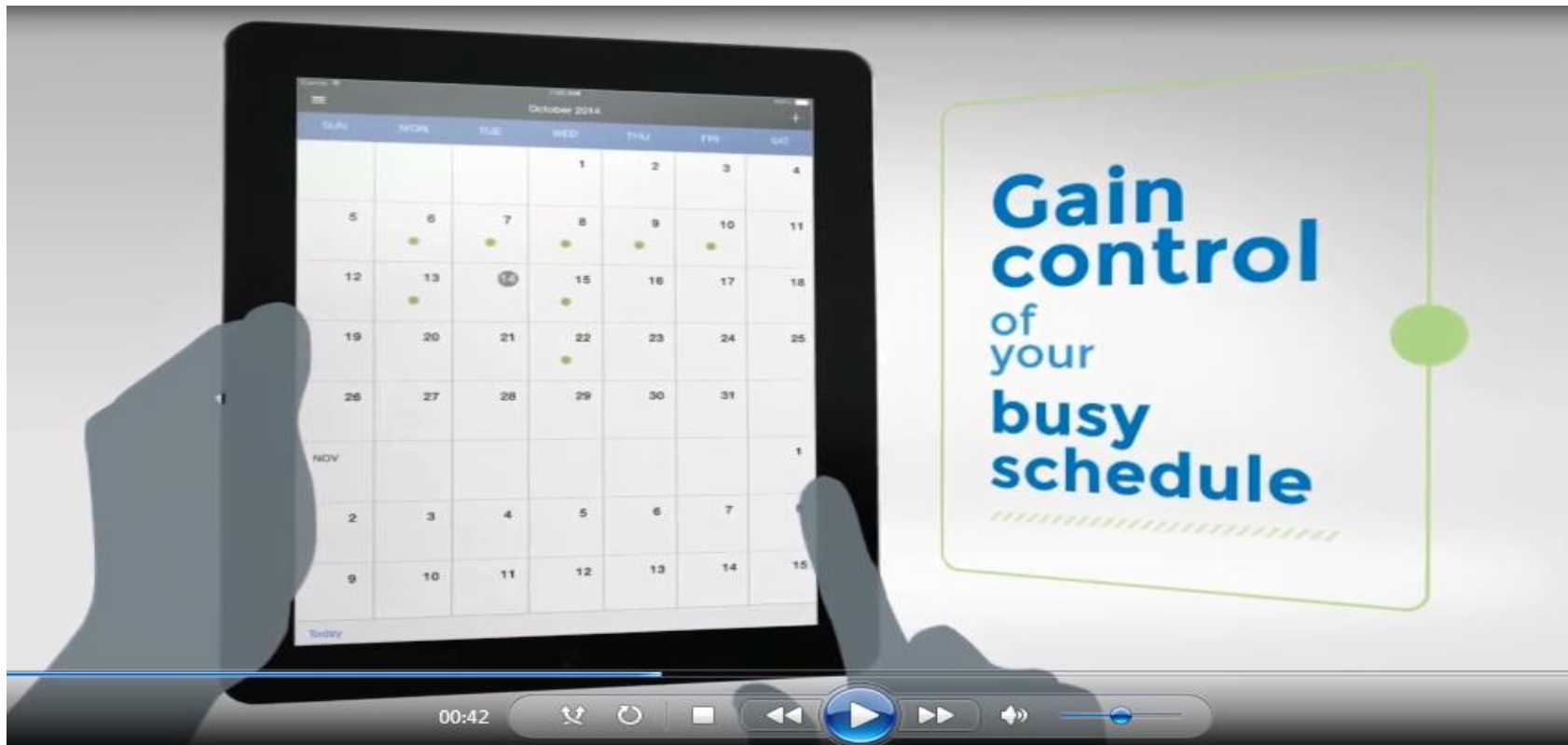


Image of Video Demonstration

Appendix AT



New hospital scheduling and staffing application -- KP Schedule -- to launch in July. A message from Theresa Brodrick and Kevin Hart .

Leadership Message to: LEADERSHIP MESSAGE

04/17/2017 03:52 PM

Bcc: Lisa J Massarweh

This message is for **Staffing Office employees at South San Francisco and San Rafael medical centers.**

Leadership Message

Northern California Communications

This message is being sent on behalf of Theresa Brodrick, Regional Chief Nursing Officer and Vice President, Clinical Integration, KFH/HP; and Kevin Hart, Senior Vice President, Strategic Development and Technology, KFH/HP.

We are pleased to announce the launch of KP Schedule in Northern California beginning this July. KP Schedule is a new hospital scheduling and staffing application which will replace ANSOS.

KP Schedule will be rolled out to all hospitals in Northern California in waves, beginning with South San Francisco and San Rafael medical centers and continuing until all employees now scheduled in ANSOS are moved to KP Schedule. Full deployment throughout the Northern California Region is expected to be completed by April 15, 2019.

Training for Staffing Office employees will begin on May 15. Training and additional information on how to use the new system will be provided closer to implementation for support service representatives, managers, hospital nurses, patient care technicians, and other appropriate staff.

The current ANSOS system, which has been in use region-wide for more than 30 years, is antiquated and is not able to keep pace with other KP data systems. KP schedule will enable us to use today's technology — web, desk/laptop computers, and personal mobile devices — to greatly improve the scheduling experience for users and managers.

It will enhance the way employees choose or are scheduled for shifts in alignment with collective bargaining agreements, and the way we manage requests for time off, additional shifts, and so on.

Benefits of KP Schedule

- The new KP Schedule system will let users see schedules online, quickly update information, and swiftly respond to a variety of staffing requests.
- Employees will be able to view their information — including shifts, on-call and calendar requests, on their computer or mobile device.
- Employees can view requests to work and pick up shifts that are convenient for them, submit vacation and other time-off requests, and even track licensure and associated expiration dates.
- Employees will no longer have to stand in line at staffing offices.
- Employees can rapidly request and respond to scheduling changes.
- The new, web-based system is convenient — employees can log on from work or home using a computer or smart mobile device.

KP Schedule Launch: Talking Points and FAQ for Leaders and Managers
 Rev. 04/14/17

For internal, verbal use only.

QUESTIONS & ANSWERS

1) Why is Kaiser Permanente changing its hospital nurse staffing scheduling system?

Kaiser Permanente is committed to keeping KP the best place to work in health care. Part of that commitment means investing in technology and resources that can provide greater efficiency, accuracy, and convenience for our nurses and other frontline staff.

There is a significant need for a new hospital staffing scheduling system. The current system, ANSOS, has been in place since 1986 and is antiquated, inconvenient, and inefficient. All codes in ANSOS have been exhausted, which limits the ability to expand or upgrade the system and the compatibility with new TIME codes and other KP data systems.

The time staff spend on the current system is better devoted to doing what they do best — providing high-quality care and service to our patients and members.

2) How is the KP Schedule system better?

KP Schedule system uses today's technology to greatly improve the way nurses, patient care technicians, and other frontline staff are scheduled for shifts and can manage requests for time off, shift trades, additional shifts, etc. The new system is web-based and conveniently accessible from work or home computer or personal mobile device.

Other benefits include:

- No more standing in line at staffing offices
- Instant response to scheduling requests
- Improved flexibility, portability, and efficiency
- Integrated call system
- Potential for expansion to other departments

3) How will I learn to use the new system and will I be paid for training?

Assistance will be provided to help you learn how to use the new KP Schedule system. You will be scheduled for a 1- to 1.5-hour training session on the new system as we get closer to implementation. Training time will be paid time. Stay tuned for more information.

4) When will this change take place?

The new system is expected to be deployed beginning in the second quarter of 2017.

5) Will this new system impact existing FTEs?

We are always evaluating our staffing and operational needs in order to provide the best care and service. We don't expect the new system to affect any positions, other than to make their scheduling experience more convenient and efficient.

6) Will implementation cause any down time of the current staffing scheduling system or other disruption?

There will be no disruption to patient care or hospital services during the implementation phase.

7) Does this change need to be bargained with any unions?

The new scheduling system and scheduling processes will be compliant with our contractual obligations for the collective bargaining agreements in place.

KP Schedule Launch: Talking Points and FAQ for Leaders and Managers
Rev. 04/14/17

For internal, verbal use only.

We are committed to keeping Kaiser Permanente the best place to work in health care.

- Part of that commitment is investing in technology that can improve administrative functions for our nurses and other frontline staff.

There is a significant need for a new hospital staffing scheduling system.

- The current ANSOS system has been in place since 1986 and is antiquated, inconvenient, and inefficient.
- All codes in ANSOS have been exhausted, which limits the ability to expand or upgrade the system and the compatibility with new TIME codes and other KP data systems.

We are transitioning to a new scheduling system.

- The new system, KP Schedule, which already is being used in KP's Northwest Region, will be implemented first at San Rafael and South San Francisco Medical Centers, in the second quarter of 2017. Next it will be rolled out in a phased manner throughout the Region.
- There will be no disruption to patient care or hospital services during the implementation phase.
- The new scheduling system and scheduling processes will be compliant with our contractual obligations for the collective bargaining agreements in place.

KP Schedule will improve the scheduling experience for nurses and managers. The new system enhances the way nurses are scheduled for shifts and can manage requests for time off, shift trades, additional shifts, etc.

- The new system is web-based and conveniently accessible from a work or home computer, or from a personal mobile device.
- Employees no longer will have to stand in line at staffing offices
- The system provides rapid response to scheduling requests and other changes
- Users will enjoy improved flexibility, portability, and efficiency of staffing processes
- The use of electronic assignment sheets eliminates the need for paper

Training in KP Schedule will be provided.

- Employees will be scheduled for a training session before the new system is implemented at their medical center.
- More information will be coming as implementation draws near.

Appendix AU



find your balance

WORK AND LIFE, IN BETTER HARMONY

Take control of your schedule with Kaiser Permanente's new staffing and scheduling application, **KP Schedule**. With this powerful tool, you can indicate your availability and scheduling preferences, and much more:

- View your individual calendars, including shifts on-call, and calendar requests, on your computer or smart mobile device.
- View requests to work shifts, and pick up those that work with your schedule.
- Ask to trade shifts with other staff members.
- Submit requests for vacation.
- Track your licensure and associated expiration dates

KP Schedule will be rolled out beginning this summer, for all employees now scheduled using ANSOS. More information will be coming soon!



Appendix AV

KP Schedule – Staffing and Scheduling
Initial SYSTEM Training

PREPARATION

Dates: From [Start Date] to {End Date]

Times: 8:00 AM – 4:30 PM

Breaks & Lunch: 10 AM (15 min) – 12 NOON (30 min) – 2:30 PM (15 min)

OBJECTIVES

- Introduce KP Schedule access and functionality from End User perspective
- Provide an overview of all KP Schedule staffing and scheduling processes
- Ensure Staffing Office employees are able to create, manage, and archive their department schedules and adjust daily staffing levels according to census and acuity
- Discuss basics of system build and cost center configuration

PREREQUISITES

- Windows training or similar experience
- Attendee user accounts established

EQUIPMENT

- Projection screen
- 1 PC for each attendee set up per contracted hardware requirements

MATERIALS

Item	Responsibility
Computer Based Training – KP Schedule (Employee)	Client
System Training Agenda	Client
KP Schedule User Guide	Client
Quick Reference – Daily Maintenance	Client
Quick Reference – Supervisors	Client
Staffing and Scheduling Top 10 Reports	Client

Recommended Participants

Kaiser Attendees:

- Staffing Office Employees
- Staffing Office Manager/Supervisor
- Facility Super Users
- Department Managers

GE Attendees:

- Implementation Consultant

AGENDA DAY ONE

Time	Topic	User Guide Reference Page Number
	<input type="checkbox"/> Orientation/Introductions	
	<input type="checkbox"/> General Training Objectives	
	<input type="checkbox"/> Training Logistics (Sign In, Breaks, Lunch Break)	
	<input type="checkbox"/> Historical Perspective/Ice Breaker	
	<input type="checkbox"/> Employee Computer Based Training (CBT) Review	
	<input type="checkbox"/> Introduction	
	<input type="checkbox"/> Logging In & Home Page	
	<input type="checkbox"/> Timecard Screen (TCS)	
	<input type="checkbox"/> Trading Shifts	
	<input type="checkbox"/> Add Calendars	
	<input type="checkbox"/> Availability/Unavailability and Voluntary Time Off (VTO) Requests	
	<input type="checkbox"/> Reports	
	<input type="checkbox"/> Action Section	
	<input type="checkbox"/> System Checker	
	<input type="checkbox"/> Preferences	
	<input type="checkbox"/> Event Subscriptions	
	<input type="checkbox"/> Notification Method	
	<input type="checkbox"/> Open Shift Notification	
	<input type="checkbox"/> Help and Logging Out	
	<input type="checkbox"/> Training Environment	
	<input type="checkbox"/> Logging in as SSR	
	<input type="checkbox"/> Setting Preferred Name (Optional)	
	<input type="checkbox"/> Populate current and future schedules	
	<input type="checkbox"/> Logging in as an Employee	
	<input type="checkbox"/> Reviewing the system Sections	
	<input type="checkbox"/> Viewing the Schedule	

Time	Topic	User Guide Reference Page Number
	<input type="checkbox"/> Requesting Vacation (Adding Calendars)	
	<input type="checkbox"/> Requesting Shift Trades	
	<input type="checkbox"/> Placing Availability/Unavailability and VTO Requests	
	<input type="checkbox"/> Setting up Preferences	
	<input type="checkbox"/> Job Aides and User Guides for Employees	
	<input type="checkbox"/> Automated EE Notifications	
	<input type="checkbox"/> Employee Availability Process	
	<input type="checkbox"/> Employee Trade Request Process	
	<input type="checkbox"/> Employee Unavailability Process	
	<input type="checkbox"/> The Impact of KP Schedule Employee Self-Serve functionality on Staffing Office (SO) Processes and Workflows	
	<input type="checkbox"/> Eliminating paper from SO processes	
	<input type="checkbox"/> Exceptions (example: EE requests that require waiver of contractual agreements)	

AGENDA DAYS TWO-FOUR

Time	Topic	User Guide Reference Page Number
	<input type="checkbox"/> Introduction to KP Schedule – Staffing and Scheduling	5
	<input type="checkbox"/> Training Goal	5
	<input type="checkbox"/> Organization Unit	5
	<input type="checkbox"/> Session Overview	6
	<input type="checkbox"/> Getting Familiar with Staffing and Scheduling	8
	<input type="checkbox"/> Navigation	8
	<input type="checkbox"/> Screen Layout	8
	<input type="checkbox"/> Screen Components	9
	<input type="checkbox"/> Logging on to KP Schedule	12
	<input type="checkbox"/> Password/Password Reset	13
	<input type="checkbox"/> Help Section	14
	<input type="checkbox"/> Navigation Icons	15
	<input type="checkbox"/> <i>Navigation Tips</i>	15
	<input type="checkbox"/> Searching for Records	16
	<input type="checkbox"/> Connecting Information	20
	<input type="checkbox"/> Scheduling	22
	<input type="checkbox"/> Schedule Screen Areas	22
	<input type="checkbox"/> KP Schedule Configuration	24
	<input type="checkbox"/> Scheduling Responsibilities	26
	<input type="checkbox"/> The Staff Scheduler Screen	28
	<input type="checkbox"/> Schedule Components	30
	<input type="checkbox"/> Pay Codes	30
	<input type="checkbox"/> Activity Codes	31
	<input type="checkbox"/> <i>Format (Transparent vs. Solid)</i>	31
	<input type="checkbox"/> Profiles	33
	<input type="checkbox"/> Stations	34

Time	Topic	User Guide Reference Page Number
	<input type="checkbox"/> Positions	36
	<input type="checkbox"/> Creating and Balancing a Schedule	37
	<input type="checkbox"/> Rotating Schedules	37
	<input type="checkbox"/> Set Up/Edit/Delete	39
	<input type="checkbox"/> Expiring Rotating Schedule	44
	<input type="checkbox"/> Opening a Department Schedule	47
	<input type="checkbox"/> Selection Styles and Schedule Validation	47
	<input type="checkbox"/> Creating Department and Employee Schedule	48
	<input type="checkbox"/> Schedule Screen Components	49
	<input type="checkbox"/> Schedule Screen Functionality	55
	<input type="checkbox"/> Making Changes Directly on the Schedule Screen	56
	<input type="checkbox"/> Schedule Notes	60
	<input type="checkbox"/> <i>Link to Employee TCS in the Portal</i>	61
	<input type="checkbox"/> Responding to Employee Request	62
	<input type="checkbox"/> Limiting Schedule Information Displayed	64
	<input type="checkbox"/> <i>Grouping</i>	64
	<input type="checkbox"/> <i>Sorting</i>	64
	<input type="checkbox"/> <i>Viewing Highlighted Activities or Pay Codes</i>	64
	<input type="checkbox"/> Filters (Enter, Expand, Apply, Clear, Save, Load, <i>Collapse</i>)	64
	<input type="checkbox"/> <i>Opening Schedule by Schedule Group/Profile Group</i>	65
	<input type="checkbox"/> Balancing a Schedule	65
	<input type="checkbox"/> Adjusting the Schedule	69
	<input type="checkbox"/> <i>Balancing Grid Format</i>	70
	<input type="checkbox"/> Employee Schedule Exceptions	72
	<input type="checkbox"/> Viewing Calculated Data	76
	<input type="checkbox"/> Publishing Schedule	77

Time	Topic	User Guide Reference Page Number
	<input type="checkbox"/> Printing Schedule	78
	<input type="checkbox"/> Retaining Schedule History	80
	<input type="checkbox"/> Schedule Archives	81
	<input type="checkbox"/> Scheduling Workflow and Timeline	84
	<input type="checkbox"/> Shift Trades	89
	<input type="checkbox"/> Daily Schedule Maintenance	91
	<input type="checkbox"/> Current Staffing Overview	92
	<input type="checkbox"/> CSO Screen Navigation	93
	<input type="checkbox"/> Staffing Summary and Detail	
	<input type="checkbox"/> Schedule Notes on the CSO Screen	
	<input type="checkbox"/> Daily Staffing Tasks	97
	<input type="checkbox"/> Updating CSO Information	104
	<input type="checkbox"/> Compare Employees	106
	<input type="checkbox"/> Broadcast Open Shift Notification	113
	<input type="checkbox"/> Sending Someone Home Due to Low Census	123
	<input type="checkbox"/> <i>Payroll Reconciliation</i>	125
	<input type="checkbox"/> <i>Active Roster on CSO Screen</i>	125
	<input type="checkbox"/> <i>Preferences</i>	125
	<input type="checkbox"/> <i>Default Organization Unit</i>	125
	<input type="checkbox"/> <i>Default Schedule Group</i>	125
	<input type="checkbox"/> <i>Event Subscriptions</i>	125
	<input type="checkbox"/> <i>Reports</i>	125
	<input type="checkbox"/> <i>Audits</i>	125
	<input type="checkbox"/> <i>Expired License Verification</i>	125
	<input type="checkbox"/> <i>Employee Note History</i>	125
	<input type="checkbox"/> <i>Staffing Templates</i>	125
	<input type="checkbox"/> <i>Scheduling Reports</i>	125
	<input type="checkbox"/> <i>Qualified Staff Report</i>	125

Time	Topic	User Guide Reference Page Number
	<input type="checkbox"/> Glossary	126

AGENDA DAY FIVE

Time	Topic	User Guide Reference Page Number
	<input type="checkbox"/> Staffing Office Processes – KP Job Aides	
	<input type="checkbox"/> Creating Employee Record	
	<input type="checkbox"/> KP Schedule Interfaces	
	<input type="checkbox"/> New Hires & Transfers into KP Schedule	
	<input type="checkbox"/> Non-LCRC License	
	<input type="checkbox"/> Individual Rotating Schedule	
	<input type="checkbox"/> Assigning Employee Stations	
	<input type="checkbox"/> Employees Manually Entered into KP Schedule	
	<input type="checkbox"/> Cost Center Configuration (Informational)	
	<input type="checkbox"/> Cost Center Staffing Template	
	<input type="checkbox"/> Scheduling Process	
	<input type="checkbox"/> Create 4-Week Schedule	
	<input type="checkbox"/> Schedule Archive	
	<input type="checkbox"/> Holiday (UHW & L29) Process	
	<input type="checkbox"/> Committee	
	<input type="checkbox"/> Extended Leave	
	<input type="checkbox"/> Modified Work	
	<input type="checkbox"/> Temporary Schedule Changes	
	<input type="checkbox"/> My Totals on Schedule Grid	
	<input type="checkbox"/> Publishing Schedule	
	<input type="checkbox"/> Daily Staffing	
	<input type="checkbox"/> Daily Availability Assessment	
	<input type="checkbox"/> Updating Acuity	
	<input type="checkbox"/> Sick Calls	
	<input type="checkbox"/> Floating Staff	
	<input type="checkbox"/> Broadcast Open Shift	

Time	Topic	User Guide Reference Page Number
	<input type="checkbox"/> Daily Shift Roster by Schedule Group	
	<input type="checkbox"/> Voluntary Cancels	
	<input type="checkbox"/> Review Time Off Requests on Posted Schedule	
	<input type="checkbox"/> Trades assessment	
	<input type="checkbox"/> Timekeeping	
	<input type="checkbox"/> Payroll Reconciliation	
	<input type="checkbox"/> Terminations and Transfers Out	
	<input type="checkbox"/> Transfer out of KP Schedule	
	<input type="checkbox"/> Transfer within KP Schedule	
	<input type="checkbox"/> Termination Revision/Reversal	
	<input type="checkbox"/> Reports and Audits	
	<input type="checkbox"/> Expired License Verification	
	<input type="checkbox"/> Audits	
	<input type="checkbox"/> Training Conclusion	
	<input type="checkbox"/> Training Evaluation	
	End of Session	

Training Agenda

Appendix AW

KP Schedule Collateral CARE DELIVERY TECHNOLOGY SERVICES

Self-Service

FAQs

KP Schedule Frequently Asked Questions

- I forgot my KP Schedule Password, how do I reset it?**
 - KP Schedule uses your Windows (network) password for Authentication. If you forget your password, you can call the national helpdesk, and ask them to reset it for you. Or log on to a shared computer, and go to <https://password.kp.org> and follow the prompts
 - NOTE: When you contact the help desk, they will provide you with a temporary one that you will need to change to your own before you can log in to KP Schedule. To do this Log in to any Non Shared computer with your new password. You will be prompted to change it before you can continue. This new password will be your permanent Windows password used for access to most KP resources.
- How do I download the Mobile app?**
 - From your iPhone/iPad or Android device connect to your App store
 - Search for API Healthcare Mobile WorkForce
 - Choose Install – The App is free
 - Once installed you will need to set it up as follows
 - The Hospital Affiliation Code you will enter is AP003387
 - Your User name is "CSV" + your NUID (CSA123456)
 - Your Password is your Windows Password (Must be a permanent password not a temporary one that requires changing)
- How do I see my current schedule?**
 - Log in to KP Schedule.
 - Click the Employee tab along the top row.
 - Click the Orange button labeled Open Current Schedule
 - Your current schedule will be displayed on the top row and the department schedule is displayed beneath it.
 - By placing your mouse over the code in the cell under the date, you can see the details for that shift, including the profile you are working in, your start and end time & location
- How do I request Time Off**
 - Log in to KP Schedule and click the Employee tab
 - Click the Orange button under employee Favorites that says Add Calendar
 - Enter or choose the date you are requesting.
 - Select the Pay Code for the reason you are requesting (such as VAC for vacation)
 - Enter your normal shift start time
 - Enter the number of hours you want to take off
 - Add any notes you wish to have considered by the reviewer
 - Click Save

Trifolds (Cheat Sheets)

The trifold cheat sheets provide step-by-step instructions for common tasks in KP Schedule. The first sheet, 'Logging On', details the process of using a NUID and Windows password. The second sheet, 'Requesting Time Off', covers adding a calendar, selecting dates, and submitting requests. The third sheet, 'Viewing the Department Schedule', explains how to navigate to the employee section, open current schedules, and view department-wide schedules. It also includes a 'Terminology' table and 'Navigation Icons'.

TERM	NOTE
ANSOS	KP Schedule
Shift Codes	Schedule / Activity
Time Off Request	Adding a Calendar
Shift Assignment	Profile

Navigation Icons	Description
	Expanded Icon
	Collapse Icon
	Drop Down Menu Arrow
	Read Only Access
	Request Field
	List Selector
	Field Help

Intranet

The screenshot shows the KP Schedule intranet page within the South San Francisco Medical Center system. The page title is 'KP Schedule STAFFING & SCHEDULING'. It features a navigation menu on the left with options like 'Clinical Tools', 'Advanced Directives', and 'Clinical Tools'. The main content area includes an overview of the system, a list of 'What's New' items, and a 'Training is available' section. The page is designed for clinical staff to manage their schedules and access related resources.

http://kpnet.kp.org:81/ncal/sma/southsanfrancisco/clinicaltools/kp_schedule/index.htm

Appendix AX

Table 1. Capital Expense Summary

Capital Expense Summary							
	2014	2015	2016	2017	2018	2019	2020+
Decentralized	\$ 2,434,000	\$ 2,540,635	\$ 856,162	\$ 1,714,434	\$ 921,402	\$ -	\$ -
Centralized	\$ 2,434,000	\$ 2,540,635	\$ 2,167,039	\$ 13,221,807	\$ 2,197,178	\$ -	\$ -
Inputs							
Average Hiring and Training Costs	\$ 3,500						
New Hire % (Centralized)	25%						
Calculations							
	2014	2015	2016	2017	2018	2019	2020+
IT Project Costs							
Software and Hosting	\$ 1,624,000	\$ 802,458	\$ 565,186	\$ 282,593	\$ -	\$ -	\$ -
API Professional Services (consulting)	\$ 88,000	\$ 513,333	\$ 225,370	\$ 1,215,040	\$ -	\$ -	\$ -
Interface Development	\$ 331,000	\$ 569,233	\$ -	\$ -	\$ -	\$ -	\$ -
Core CA Project Team (KP IT team)	\$ 311,000	\$ 481,611	\$ 65,606	\$ -	\$ -	\$ -	\$ -
Business Project Costs							
HRT Recharges	\$ 80,000	\$ 174,000	\$ -	\$ -	\$ -	\$ -	\$ -
PCS Training	\$ -	\$ -	\$ -	\$ 216,801	\$ 921,402	\$ -	\$ -
Real Estate Development Costs							
Geographic Hub Development Costs	\$ -	\$ -	\$ 1,697,774	\$ 5,093,323	\$ -	\$ -	\$ -
Centralized Development Costs	\$ -	\$ -	\$ 1,284,240	\$ 3,852,720	\$ -	\$ -	\$ -
New FTEs/Skill Mix in Staffing Offices							
Staffers New Hire Costs (Centralized)	\$ -	\$ -	\$ -	\$ 63,300	\$ 10,550	\$ -	\$ -
Staffing Office Director Hiring Costs	\$ -	\$ -	\$ 46,638	\$ -	\$ -	\$ -	\$ -
Severance Costs							
Staffer Severance Costs (Decentralized)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Manager Severance Costs (Decentralized)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Staffer Severance Costs (Centralized)	\$ -	\$ -	\$ -	\$ 7,591,354	\$ 1,265,226	\$ -	\$ -
Manager Severance Costs (Centralized)	\$ -	\$ -	\$ -	\$ 401,094	\$ 66,849	\$ -	\$ -
Assumptions							
Technology costs were largely fixed due to contractual agreements with API							
Training of staff nurses and staffing office personnel pushed out to 2017 based on revised API timeline							
Average construction costs per sq. ft. assumes building shelled space developed to general KP call center; assumes that the property leased is not already equipped with the correct technology							
Increased lease and development costs 10% from 2014 estimates to account for inflation							
Assumed that other development costs stayed constant							
Total fully loaded development costs were allocated with 1/4 in the first year and 3/4 in the second year, due to a long anticipated approval and design timeline							
Total seats are greater than proposed headcount to allow room for expansion							
Current staffing office spaces that are vacated due to consolidation could be repurposed for use as general administrative space, practitioner offices, and potentially clinical space; this opportunity presents substantial benefits, but are difficult to quantify without knowing how the space will be used							
Average training costs for new staffer FTEs estimated to be around \$3,500, with 25% of the employees in both the geographic hub and centralized model respectively, reflecting estimated vacancy rates in the new offices (headcount that is not within 45 miles of the assumed new locations); depending on the location of the offices, this rate may be higher or lower							
Average recruiting and training costs for staffing office director assumed to be 4/12 of his/her fully loaded \$186,350 salary							
Average severance cost for Support Service Representatives (SSR) based on one year's compensation; assumed that 25% of SSRs would take severance and that the rest would be repurposed							
Should unionized employees be granted 1 year paid redeployment time through EISA program (part of TAP severance package), severance costs will increase substantially							
Average severance cost for managers based on one year's compensation; assumed that 75% of managers would be redeployed within KP without paid redeployment							
Actual severance payout will depend on the location at which the staffing office is built and the number of employees that are willing to be repurposed							
Headcount used for severance includes only active employees							

Table 2. Operating Expense Summary

Operating Expense Summary								
	946744 \$	2014	2015	2016	2017	2018	2019	2020+
Decentralized		\$ 97,723	\$ 489,686	\$ 1,928,744	\$ 2,619,907	\$ 1,956,212	\$ 1,446,337	\$ 1,471,781
Centralized		\$ 97,723	\$ 489,686	\$ 2,156,025	\$ 3,529,032	\$ 2,865,337	\$ 2,355,462	\$ 2,380,906

Inputs	
% of 2016 that Staffing Office Director is working	25.00%
Staffing Office Director Salary	186,550
# Department Managers	1129
Annual NM Turnover Rate	5%
Cost of Training	\$78

Calculations													
	2014	2015	2016	2017	2018	2019	2020+	2021	2022	2023	2024	2025	
IT Project Costs													
IT Staff Expenses	\$ -	\$ -	\$ 315,748	\$ 821,906	\$ 593,810	\$ 593,810	\$ 593,810	\$ 593,810	\$ 593,810	\$ 593,810	\$ 593,810	\$ 593,810	
Software Maintenance (API license and mobile services)	\$ -	\$ -	\$ 234,252	\$ 234,252	\$ 241,280	\$ 248,518	\$ 255,973	\$ 263,653	\$ 271,562	\$ 260,280	\$ 260,280	\$ 260,280	
Outside Services (API hosting costs)	\$ -	\$ -	\$ -	\$ 282,593	\$ 582,142	\$ 599,606	\$ 617,594	\$ 636,122	\$ 655,205	\$ 674,862	\$ 695,107	\$ 715,961	
Business On-Going Support Costs													
API On-Going Support Costs	\$ 97,723.00	\$ 489,686.00	\$ 946,744	\$ 849,156	\$ 329,578	\$ -	\$ -						
Staffing Office Improvement Support Costs	\$ -	\$ -	\$ 432,000	\$ 432,000	\$ 205,000	\$ -	\$ -						
On-Going API & Competency Training (for Nurse Mgr)	\$ -	\$ -	\$ -	\$ -	\$ 4,403	\$ 4,403	\$ 4,403						
Real Estate Leasing Costs													
Leasing Costs (geographic hub)			\$ 229,193	\$ 916,773	\$ 916,773	\$ 916,773	\$ 916,773						
Leasing Costs (centralized)	\$ -	\$ -	\$ 161,989	\$ 647,955	\$ 647,955	\$ 647,955	\$ 647,955						
New FTEs/Skill Mix in Staffing Offices													
Staffing Office Director Salary	\$ -	\$ -	\$ 65,293	\$ 261,170	\$ 261,170	\$ 261,170	\$ 261,170						

Assumptions

Figures provided for on-going IT expenses were pro-rated for 2016 based on the anticipated API roll-out timeline
 PM (temp) and Consultant (temp) for API implementation team extended through 2017 based on revised API timeline
 Staffing office improvement team (to standardize processes and implement FTE reduction) assumed to be led by the Staffing Office Director and consisting of 1 temp PM, 2 full-time consultants, and 8 additional consultants cascaded in
 On-going API & competency training for new department managers estimated to be 1 hour at a rate of \$78 (from original analysis)
 Assumed 5% department manager turnover (consistent with average KP-wide employee turnover)
 Increased lease and development costs 10% from 2014 estimates to account for inflation
 Actual lease rates will vary per listing and KP Real Estate negotiated rate
 Estimated \$186,500 (\$130,000 + benefits) salary for staffing office director validated by Doug Barretto

Table 3. Return on Investment- Centralized Model

Centralized Model												
Description	Financial Impact (In Millions)											
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	5 Year Totals	10 year total
Benefits	-\$2.02	\$7.74 M	\$30.77 M	\$34.16 M	\$34.16 M	\$34.16 M	\$34.16 M	\$34.16 M	\$34.16 M	\$34.16 M	\$104.8 M	\$275.58 M
Overtime and Premium Pay	-	\$2.7 M	\$8. M	\$8.3 M	\$8.3 M	\$8.3 M	\$8.3 M	\$8.3 M	\$8.3 M	\$8.3 M	\$27.29 M	\$68.78 M
Staffer/Scheduler/Timekeeper FTEs	-	\$2.96 M	\$12.56 M	\$15.3 M	\$15.3 M	\$15.3 M	\$15.3 M	\$15.3 M	\$15.3 M	\$15.3 M	\$46.13 M	\$122.62 M
Staffing Office Manager FTEs	-	\$.4 M	\$1.71 M	\$1.88 M	\$1.88 M	\$1.88 M	\$1.88 M	\$1.88 M	\$1.88 M	\$1.88 M	\$5.88 M	\$15.29 M
ANSOS Retirement	-\$.72M	\$.72 M	\$.54 M	\$.72 M	\$.72 M	\$.72 M	\$.72 M	\$.72 M	\$.72 M	\$.72 M	\$.54 M	\$ 4.14 M
Discontinue AtHDC	-\$1.3	\$1.30	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$7.8 M
Shift Differential	-	\$.77 M	\$1.39 M	\$1.39 M	\$1.39 M	\$1.39 M	\$1.39 M	\$1.39 M	\$1.39 M	\$1.39 M	\$4.96 M	\$11.93 M
FTE Disparities	-	\$2.92 M	\$5.26 M	\$5.26 M	\$5.26 M	\$5.26 M	\$5.26 M	\$5.26 M	\$5.26 M	\$5.26 M	\$18.71 M	\$45.02 M
Costs	\$6.12 M	\$17.15 M	\$6.63 M	\$2.36 M	\$2.38 M	\$2.38 M	\$2.38 M	\$2.38 M	\$2.38 M	\$2.38 M	\$34.63 M	\$46.54 M
Capital Expenses												
IT Project Costs (including API costs)	\$.86 M	\$1.5 M	\$1.5 M	-	-	-	-	-	-	-	\$3.85 M	\$3.85 M
Business Project Costs	\$.08 M	\$.22 M	\$.92 M	-	-	-	-	-	-	-	\$1.21 M	\$1.21 M
Real Estate Development	\$2.98 M	\$3.85 M	-	-	-	-	-	-	-	-	\$6.83 M	\$6.83 M
New FTEs/Skill Mix in Staffing Offices	\$.05 M	\$.06 M	\$.01 M	-	-	-	-	-	-	-	\$.12 M	\$.12 M
Severance Costs	-	\$7.99 M	\$1.33 M	-	-	-	-	-	-	-	\$9.32 M	\$9.32 M
Operating Expenses												
IT Project Costs (including API costs)	\$.55 M	\$1.34 M	\$1.42 M	\$1.44 M	\$1.47 M	\$1.47 M	\$1.47 M	\$1.47 M	\$1.47 M	\$1.47 M	\$6.22 M	\$13.55 M
Business On-Going Support Costs (Training)	\$1.38 M	\$1.28 M	\$.54 M	\$.004 M	\$.004 M	\$.004 M	\$.004 M	\$.004 M	\$.004 M	\$.004 M	\$3.21 M	\$3.23 M
Real Estate Leasing Costs	\$.16 M	\$.65 M	\$.65 M	\$.65 M	\$.65 M	\$.65 M	\$.65 M	\$.65 M	\$.65 M	\$.65 M	\$2.75 M	\$5.99 M
New FTEs/Skill Mix in Staffing Offices	\$.07 M	\$.26 M	\$.26 M	\$.26 M	\$.26 M	\$.26 M	\$.26 M	\$.26 M	\$.26 M	\$.26 M	\$1.11 M	\$2.42 M
Net Impact	-\$6.14 M	-\$9.41 M	\$24.14 M	\$31.8 M	\$31.77 M	\$31.77 M	\$31.77 M	\$31.77 M	\$31.77 M	\$31.77 M	\$70.17 M	\$229.04 M
Cumulative Net Impact	-\$6.14 M	-\$17.55 M	\$6.59 M	\$38.39 M	\$70.17 M	\$101.94 M	\$133.72 M	\$165.49 M	\$197.27 M	\$229.04 M		
5 Year Net Present Value	\$42.49 M											
Break Even Point	2.73 years											

Notes:

- Reduce OT by 1% in centralized model (avg wage rate \$80/hr) beginning in 2018. Overtime savings calculated assuming a 1% reduction in total overtime hours across regular OT, double OT, and 3rd weekend OT, with more weight placed on reductions in double and 3rd weekend OT
- FTEs needed were calculated in two ways: 1) based on a ratio of 1 cross-trained staffer/scheduler to 175 employees (conservative estimate per LMI benchmark of 1:220 for community hospitals) and 2) based on a ratio of 1 cross-trained staffer/scheduler to 200 staffed beds; FTEs were adjusted in order to ensure adequate coverage of all shifts; Employee count includes all bedded units plus respiratory therapy and agency nurses (avg. .9 FTEs); peri-op and support service departments were not included as they are not consistently staffed by the staffing office
- Additional timekeeper FTEs were included in each model prior to the expected KP Time replacement date due to additional manual processes required by the antiquated system
- All compensation figures include tax and benefits (\$98,283 for staffers/schedulers/timekeepers and \$140,446 for managers)
- Business on-going support costs include new staffing office improvement team (led by the Staffing Office Director and 10 FTE as recommended by IT and API vendor)
- Severance costs are calculated with the assumption that 5% of unionized employees will take voluntary severance of \$67,332/FTE, 75% will be repurposed through EISA within 6 months and 20% will either be repurposed through EISA in 1 year or leave without additional severance. Assumption that 75% of managers will receive standard severance and 25% will be repurposed without severance.

Table 4. Return on Investment- Decentralized Model

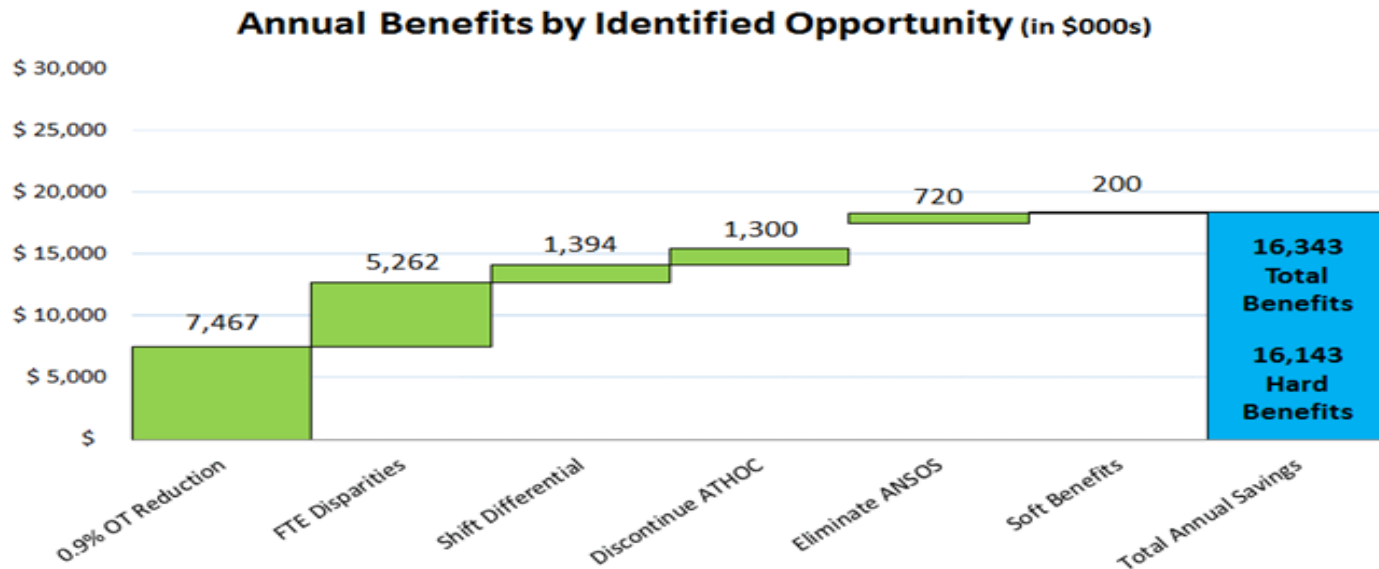
Decentralized Model													
Description	Financial Impact (In Millions)												
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	5 Year Total	10 Year	
Benefits	-\$1.02 M	\$4.1 M	\$15.7 M	\$16.14 M	\$16.14 M	\$16.14 M	\$16.14 M	\$16.14 M	\$16.14 M	\$16.14 M	\$16.14 M	\$48.06 M	\$128.78 M
Overtime	\$2.02M	\$2.43 M	\$7.2 M	\$7.47 M	\$7.47 M	\$7.47 M	\$7.47 M	\$7.47 M	\$7.47 M	\$7.47 M	\$7.47 M	\$24.56 M	\$61.9 M
Staffer/Scheduler/Timekeeper FTEs	-	-	-	-	-	-	-	-	-	-	-	-	-
Staffing Office Manager FTEs	-	-	-	-	-	-	-	-	-	-	-	-	-
At HDC Retirement	\$1.3 M	\$1.3M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$1.3 M	\$7.8 M
ANSOS Retirement	\$0.72M	\$0.72M	\$0.72 M	\$0.72 M	\$0.72 M	\$0.72 M	\$0.72 M	\$0.72 M	\$0.72 M	\$0.72 M	\$0.72 M	\$0.72 M	\$4.14 M
Shift Differential	-	\$0.77 M	\$1.39 M	\$1.39 M	\$1.39 M	\$1.39 M	\$1.39 M	\$1.39 M	\$1.39 M	\$1.39 M	\$1.39 M	\$4.96 M	\$11.93 M
FTE Disparities	-	\$2.92 M	\$5.26 M	\$5.26 M	\$5.26 M	\$5.26 M	\$5.26 M	\$5.26 M	\$5.26 M	\$5.26 M	\$5.26 M	\$18.71 M	\$45.02 M
Costs	\$2.05 M	\$6.35 M	\$2.62 M	\$2.65 M	\$2.67 M	\$2.7 M	\$2.72 M	\$2.73 M	\$2.75 M	\$2.77 M	\$16.34 M	\$30.02 M	
Capital Expenses													
IT Project Costs (Including API costs)	\$0.86 M	\$1.5 M	-	-	-	-	-	-	-	-	-	\$2.35 M	\$2.35 M
Business Project Costs	\$0.08 M	\$1.06 M	-	-	-	-	-	-	-	-	-	\$1.14 M	\$1.14 M
Real Estate Development	-	-	-	-	-	-	-	-	-	-	-	-	-
New FTEs/Skill Mix In Staffing Offices	-	-	-	-	-	-	-	-	-	-	-	-	-
Severance Costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Operating Expenses													
IT Project Costs (Including API costs)	\$0.55 M	\$1.34 M	\$1.42 M	\$1.44 M	\$1.47 M	\$1.49 M	\$1.52 M	\$1.53 M	\$1.55 M	\$1.57 M	\$6.22 M	\$13.88 M	
Business On-Going Support Costs	\$0.57 M	\$2.45 M	\$1.2 M	\$1.2 M	\$1.2 M	\$1.2 M	\$1.2 M	\$1.2 M	\$1.2 M	\$1.2 M	\$6.63 M	\$12.65 M	
Real Estate Leasing Costs	-	-	-	-	-	-	-	-	-	-	-	-	-
New FTEs/Skill Mix In Staffing Offices	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Impact	-\$1.97 M	-\$2.25 M	\$13.08 M	\$13.5 M	\$13.47 M	\$13.45 M	\$13.42 M	\$13.41 M	\$13.39 M	\$13.37 M	\$35.83 M	\$102.86 M	
Cumulative Net Impact	-\$1.97 M	-\$4.22 M	\$8.86 M	\$22.36 M	\$35.83 M	\$49.27 M	\$62.69 M	\$76.1 M	\$89.49 M	\$102.86 M			
5 Year Net Present Value	\$22.85 M												
Break Even Point	2.32 years												

Notes:

- Reduce OT by 0.9% in decentralized model (average wage rate \$80/hour)
- Overtime savings calculated assuming a 1% reduction in total overtime hours across regular OT, double OT, and 3rd weekend OT, with more weight placed on reductions in double and 3rd weekend OT
- No reduction in force

Appendix AY

Cost-Benefit Analysis



Notes:

- Reduce OT by 0.9% in decentralized model (average wage rate \$80/hour)
[current non-holiday OT (1,194,131 hours) / current productive hours (12,865,149) * 0.9%]
- Eliminate FTE incongruence: \$5,262,400/year
[FTE Disparities remediation is an opportunity to utilize an FTE up to their full status (0.6 FTE vs 0.8 FTE); based on covering gap with overtime (mix of 1.5x and 2.0x). (\$55/hour x 230 instances/week x 8hr shift x 52 weeks/year)]
- Eliminate Shift differential incongruence: \$1,394,266/year
[average FTE incongruence x average FTE (0.7) x 2080 hours x \$80/year x 9% improvement (based on Evening diff 11%, Night diff 17.5%)]
- At Hoc contract discontinuance: \$1,300,000/year
- Eliminate ANSOS production costs: \$720,000/year
- Soft Opportunity Cost Savings: Potential risk for an ANSOS failure would have financial impact (estimated at \$0.2M/yr.), but is listed in soft savings due to characterization as an opportunity cost (not measurable unless it occurs) and therefore no positive savings potential

Appendix AZ

KP Schedule Implementation Rollout Criteria Heat Map							
Medical Center	Deloitte Recommendation	Previous department discovery and UAT	2017 Labor Recommendation	Leadership stable > 6 – 12 months	Recommended early phase rollout strategy	Rank for Readiness	2017 Yearly ADC
Redwood City	2	2	2	2	2	10	81
South SF	2	2	2	1	2	9	58
San Francisco	2	0	1	2	2	7	162
Santa Clara	2	2	1	1	1	7	222
San Jose	1	0	2	2	1	6	119
Vacaville/Vallejo	0	2	2	1	1	6	164
Antioch	0	0	2	2	1	5	81
Fresno	1	0	2	1	1	5	80
Manteca	1	0	2	1	1	5	20
Modesto	1	0	2	1	1	5	98
San Rafael	0	0	2	2	1	5	57
Santa Rosa	0	0	2	2	1	5	102
Fremont	0	0	1	2	1	4	51
South Sac	0	0	2	1	1	4	156
Roseville	0	0	0	2	0	2	242
Sacramento	0	0	0	2	0	2	142
San Leandro	0	0	0	2	0	2	135
Walnut Creek	0	0	0	2	0	2	149
Oakland/Richmond	0	0	0	0	0	0	228



Medical Center Implementation Readiness Assessment

Appendix AAA

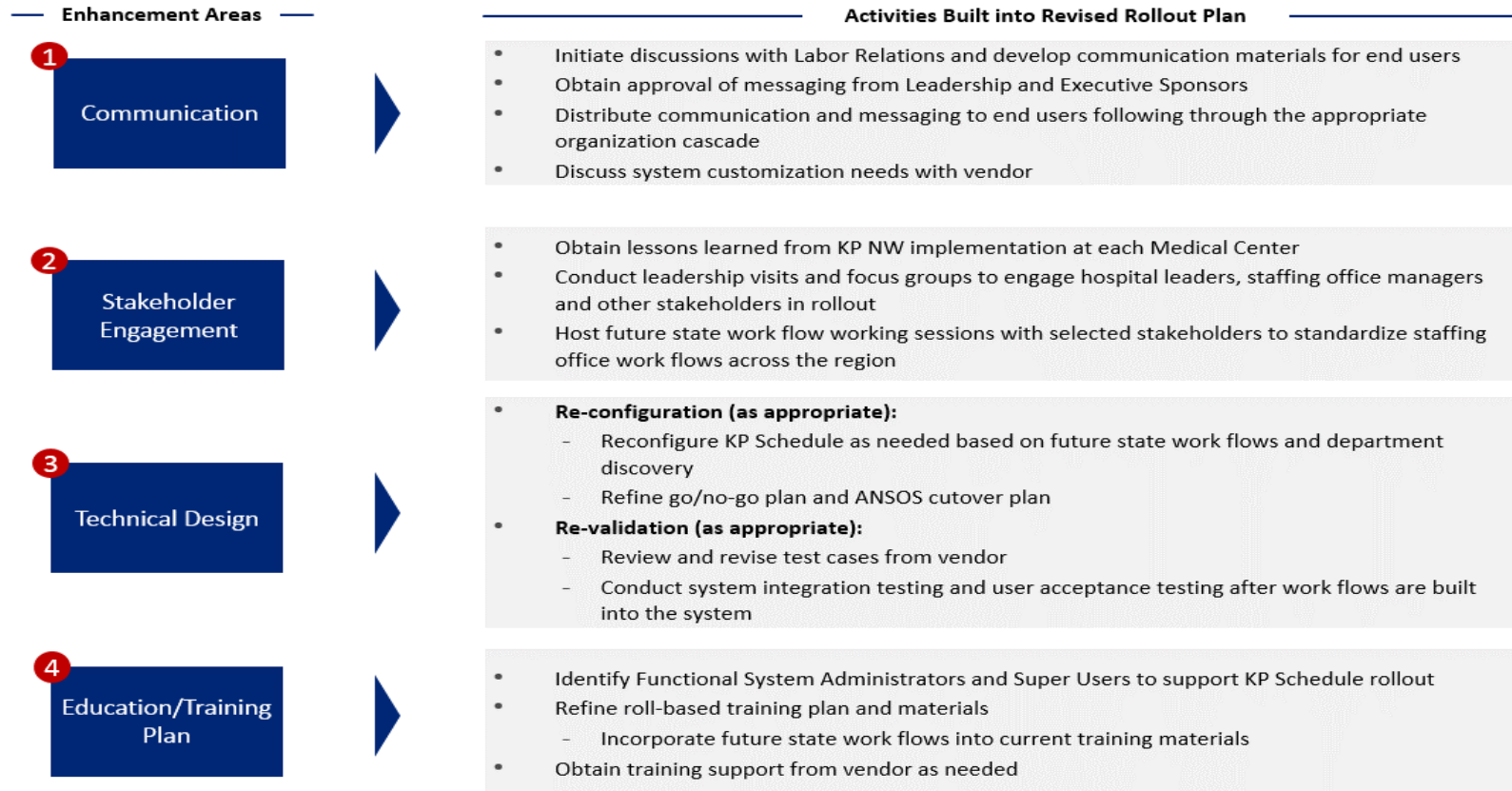
Deployment Assumptions and Dependencies

	Assumptions	Dependencies
Communications	<ul style="list-style-type: none"> Communication to relevant unions will take place from April 15th, 2016 to September 1st, 2016 	<ul style="list-style-type: none"> End-user communication is dependent on the completion of communication to relevant unions
Stakeholder Engagement	<ul style="list-style-type: none"> Leadership visits, department discovery and work flow redesign happen concurrently with OE Leadership review of the API rollout plan 	<ul style="list-style-type: none"> N/A
Re-configuration	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Configuration of API is dependent on the completion of API vendor engagement and system changes required
Re-validation	<ul style="list-style-type: none"> A portion of re-validation can overlap with the later phases of re-configuration 	<ul style="list-style-type: none"> N/A
Training Development	<ul style="list-style-type: none"> Staffing Office Manager/Employee training will be an on-site, 8-hour session with 12 participants per session Department Manager training will be an on-site, 4-hour session with 12 participants per session End Users training will be an 1.5-hour computer based training 	<ul style="list-style-type: none"> N/A
Deployment (Wave 1 – 5)	<ul style="list-style-type: none"> Wave 1 and wave 2 will include longer training period (7–8 weeks) than the other waves due to the greater collective Average Daily Census and winter season delay Super users serve as local training support resources, including facilitating open lab sessions after end-user training is completed 	<ul style="list-style-type: none"> End user training is dependent on the completion of end user messaging and training plan and materials

Appendix AAB

Key Rollout Activities

The following activities have been incorporated into the rollout plan:



Key Rollout Activities

Appendix AAC

Change Management Assessments

Change impact assessments and stakeholder assessments have been completed, and engagement tactics have been identified to mitigate risks and optimize stakeholder engagement

Change Impact Assessment

Process	Policy	People	Structure	Tech
Significant	Significant	Significant	Significant	No Change

Stakeholder Assessment

Stakeholder	Process	Policy	People	Structure	Tech	Training	Change Mgmt/Comms	Org Design
Support Service Representatives	Significant	Significant	Significant	Significant	Significant	Yes	Yes	Yes
Staffing Office Managers	Significant	Significant	Significant	Significant	Significant	Yes	Yes	Yes
Area Managers	Moderate/Low	No Change	No Change	Moderate/Low	No Change	No	Yes	Yes
Area Financial Officers	Moderate/Low	No Change	No Change	Moderate/Low	No Change	No	Yes	Yes
CNEs	Moderate/Low	No Change	No Change	Moderate/Low	No Change	No	Yes	Yes
Administrative Services Director	Moderate/Low	No Change	No Change	Moderate/Low	No Change	No	Yes	Yes
Nurse Managers/ Assistant Nurse Managers	Significant	No Change	Significant	Significant	Significant	Yes	Yes	Yes
RNs (including travelers & RT)	Significant	Significant	Significant	Moderate/Low	Significant	Yes	Yes	Yes
Labor Relations	Moderate/Low	No Change	Moderate/Low	Moderate/Low	Moderate/Low	No	Yes	Yes
HR	Moderate/Low	No Change	Moderate/Low	Moderate/Low	Moderate/Low	No	Yes	No
KP Communications	Moderate/Low	No Change	Moderate/Low	Moderate/Low	Moderate/Low	No	Yes	No
Learning and Development	Moderate/Low	No Change	Moderate/Low	No Change	Moderate/Low	Yes	Yes	No
Local Change Management Support	No Change	Significant	Significant	No Change	No Change	No	Yes	Yes
KP IT	Moderate/Low	No Change	Moderate/Low	No Change	Significant	Yes	Yes	No
Local IT	Moderate/Low	No Change	Moderate/Low	No Change	Significant	Yes	Yes	No
Vendor Counterpart Team (API/GE)	No Change	No Change	Moderate/Low	No Change	Significant	Yes	No	No

Stakeholder	Process	Policy	People	Structure	Tech	Training	Change Mgmt/Comms	Org Design
Support Service Representatives	Significant	Significant	Significant	Significant	Significant	Yes	Yes	Yes
Staffing Office Managers	Significant	Significant	Significant	Significant	Significant	Yes	Yes	Yes
Area Managers	Moderate/Low	No Change	No Change	Moderate/Low	No Change	No	Yes	Yes
Area Financial Officers	Moderate/Low	No Change	No Change	Moderate/Low	No Change	No	Yes	Yes
CNEs	Moderate/Low	No Change	No Change	Moderate/Low	No Change	No	Yes	Yes
Administrative Services Director	Moderate/Low	No Change	No Change	Moderate/Low	No Change	No	Yes	Yes
Nurse Managers/ Assistant Nurse Managers	Significant	No Change	Significant	Significant	Significant	Yes	Yes	Yes
RNs (including travelers & RT)	Significant	Significant	Significant	Moderate/Low	Significant	Yes	Yes	Yes
Labor Relations	Moderate/Low	No Change	Moderate/Low	Moderate/Low	Moderate/Low	No	Yes	Yes
HR	Moderate/Low	No Change	Moderate/Low	Moderate/Low	Moderate/Low	No	Yes	No
KP Communications	Moderate/Low	No Change	Moderate/Low	Moderate/Low	Moderate/Low	No	Yes	No
Learning and Development	Moderate/Low	No Change	Moderate/Low	No Change	Moderate/Low	Yes	Yes	No
Local Change Management Support	No Change	Significant	Significant	No Change	No Change	No	Yes	Yes
KP IT	Moderate/Low	No Change	Moderate/Low	No Change	Significant	Yes	Yes	No
Local IT	Moderate/Low	No Change	Moderate/Low	No Change	Significant	Yes	Yes	No
Vendor Counterpart Team (API/GE)	No Change	No Change	Moderate/Low	No Change	Significant	Yes	No	No

■ No Change
 ■ Moderate/Low
 ■ Significant

Appendix AAD

IRB Approval

KPNC 16-18 Scheduling and Staffing Technology to Improve Quality, Cost, & Satisfaction

Lorna Yamaguchi to: Lisa J Massarweh
Cc: Eric F Garcia

07/07/2016 09:49 PM

Follow Up: Normal Priority.

History: This message has been replied to.

Subject: KPNC 16-18 Scheduling and Staffing Technology to Improve Quality, Cost, & Satisfaction

Ms Massarweh,

As the Research Determination Official (RDO) for the Kaiser Permanente Northern California region, I have reviewed the documents submitted for the above referenced project. The project does not meet the regulatory definition of research involving human subjects as noted here:

Not Research

The activity does not meet the regulatory definition of research at 45 CFR 46.102(d):
Research means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge.

Not Human Subject

The activity does not meet the regulatory definition of a human subjects at 45 CFR 46.102(f):
Human subject means a living individual about whom an investigator conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information.

Therefore, the project is not required to be reviewed by a KP Institutional Review Board (IRB). This determination is based on the information provided. If the scope or nature of the project changes in a manner that could impact this review, please resubmit for a new determination. Also, you are responsible for keeping a copy of this determination letter in your project files as it may be necessary to demonstrate that your project was properly reviewed.

Provide this approval letter to the Physician in Charge (PIC), your Area Manager, and Chief of Service, to determine whether additional approvals are needed.

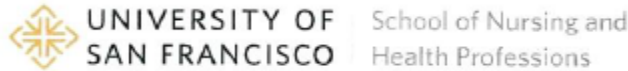
Sincerely,

Lorna Yamaguchi, MD
Research Determination Officer
Regional Director, Operations Design
The Permanente Medical Group, Inc.
mobile: (408) 859-5191

NOTICE TO RECIPIENT: If you are not the intended recipient of this e-mail, you are prohibited from sharing, copying, or otherwise using or disclosing its contents. If you have received this e-mail in error, please notify the sender immediately by reply e-mail and permanently delete this e-mail and any attachments without reading, forwarding or saving them. Thank you.

Appendix AAE

Non-Research Statement of Determination



DNP Statement of Non-Research Determination Form

Student Name: Lisa J. Massarweh

Title of Project:

Hospital Staffing & Scheduling System Replacement in a multi-hospital health system

Brief Description of Project:

A) Aim Statement:

To improve quality of care delivery and patient safety (purpose), by replacing the existing 30 year old scheduling and staffing application (what) with a web-based technology and standardized workflows for a large integrated multi-hospital health system in northern California (population) by December, 2017 (timeframe).

B) Description of Intervention:

The stand-alone legacy scheduling and staffing system will be sunset. A new web-based scheduling and staffing system will be implemented with standardized workflows and rules-based contract interpretation across the 21 hospital system allowing transparency across hospitals.

Conceptual Framework: Complexity Theory

C) How will this intervention change practice?

The intervention will leverage technology to apply rule-based logic to address factors that may contribute to nurse fatigue. The application will provide for self-service, portability/mobility, and transparency of need thus improving end-user satisfaction, efficiency, and improved patient safety.

D) Outcome measurements:

Decreased number of nurse-sensitive incident reports 3 months post implementation

Improved nurse satisfaction (survey) 3 months after implementation

Reduced non-holiday RN overtime (as a percentage of productive hours). This is a proxy measure for reducing excessive work hours and thus nurse fatigue.



To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used:
<http://answers.hhs.gov/ohrp/categories/1569>

This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.

This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:

EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST *

Instructions: Answer YES or NO to each of the following statements:

Project Title:	YES	NO
The aim of the project is to improve the process or delivery of care with established/ accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.	✓	
The specific aim is to improve performance on a specific service or program and is a part of usual care . ALL participants will receive standard of care.	✓	
The project is NOT designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does NOT follow a protocol that overrides clinical decision-making.	✓	
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does NOT develop paradigms or untested methods or new untested standards.	✓	
The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does NOT seek to test an intervention that is beyond current science and experience.	✓	
The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	✓	
The project has NO funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	✓	
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., not a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.	✓	
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following	✓	



statement in your methods section: <i>"This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board."</i>	✓	
--	---	--

ANSWER KEY: If the answer to **ALL** of these items is yes, the project can be considered an Evidence-based activity that does NOT meet the definition of research. **IRB review is not required. Keep a copy of this checklist in your files.** If the answer to ANY of these questions is **NO**, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

STUDENT NAME (Please print):

Lisa J. Massarweh

Signature of Student:

Lisa Massarweh

DATE 4/24/2016

SUPERVISING FACULTY MEMBER (CHAIR) NAME (Please print):

Dr. Keith Dawson

Signature of Supervising Faculty Member (Chair):

[Handwritten Signature]

DATE 10/01/2016

Appendix AAF- Improvement Methodology and Data Collection Tools

Table 1. *Project Data Variables*

Variable Name	Brief Description	Data Source	Possible Range of Values	Level of Measurement	Timeframe for Collection	Statistical Test
Nurse Satisfaction	Survey of nurse satisfaction via Qualtrics	Voluntary convenience sample	1-5	Likert Scale	Baseline prior to roll out; post survey 1.5-3 months after go live	N/A

Table 2. *Future Phase: Project Data Variables*

Variable Name	Brief Description	Data Source	Possible Range of Values	Level of Measurement	Timeframe for Collection	Statistical Test
Nurse-sensitive indicators	Nurse-sensitive outcome measures (falls, Central line blood stream infections, medication administration errors, hospital acquired pressure ulcers)	Risk management (MIDAS)	0-95,000	Count	Baseline prior to roll out; count monthly 1.5-3 months post deployment	N/A
RN Overtime pay (non-holiday) as a % of productive hours	RN OT as a % of productive pay	HiFi Regional payroll data repository	0-27%	Per pay period at facility level	Prior year, same pay periods: baseline average (excludes holiday pay) to 1.5-3month post deployment data pull at a pay period level by facility	N/A
Nurse Satisfaction	Number of Registered Nurse Assignment Despite Objection (ADO)s filed with complaint regarding staffing	Regional ADO monthly data repository	0-700	Count	Baseline prior to roll out; post survey 1.5-3 months after go live	N/A

Table 3. MIDAS Nurse-Sensitive Measures

Code	Description	Definition
Falls		
FALL06	Fall-Ambulating/Standing	Unplanned descent to the floor while ambulating/standing
FALL08	Fall-Assisted to Floor	Unplanned descent to the floor patient is lowered with assistance from another
FALL01	Fall-Bed/Gurney	Unplanned descent to the floor from a bed or gurney
FALL03	Fall-Chair Wheelchair/Stool/Couch	Unplanned descent to the floor from a wheelchair, stool, chair, or couch
FALL04	Fall-Exam/OR Table	Unplanned descent to the floor from an exam or operating room table
FALL05	Fall-Shower	Unplanned descent to the floor in a shower
FALL02	Fall-Toilet/Portable Commode	Unplanned descent to the floor from a toilet or portable commode
FALL07	Fall-Unknown Activity/Found On Floor	Unplanned descent to the floor from an unknown source
Infection Control		
IC03	IC-Infection, Central/Peripheral Line	Includes all lines which are central and IV lines
Medication		
Medication related issues including IV fluids or narcotics		
		Error in the giving of medication to patient.
MED05	MED-Administration	MERP Definition: A phase (node) in the medication use process that originates with giving the medication to the patient, including patient-caregiver administration. Administering activities may begin in the patient care unit, care delivery area or patient bedside and continue through the actual drug administration to the patient. Administering includes the MAR and patient arm-band check, the "five rights" and informing the patient about the medication.
Pressure Ulcers		
Hospital or care acquired pressure ulcers		
PU06	PU-HAPU, Deep Tissue Injury, Suspected	International NPUAP-EPUAP Pressure Ulcer Definition: Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue. Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layer of tissue even with optimal treatment.
PU14	PU-HAPU, Mucosal	Device related hospital acquired pressure ulcer International NPUAP-EPUAP Pressure Ulcer Definition: Mucosal Pressure Ulcers (MPru) are pressure ulcers found on mucous membranes with a history of a medical device in use at the location of the ulcer.
PU01	PU-HAPU, Stg 1	Pressure ulcer was noted during hospital stay. International NPUAP-EPUAP Pressure Ulcer Definition: Non-blanchable erythema. Intact skin with non-blanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area. The area may be painful, firm, soft, warmer or cooler as compared to the adjacent tissue. Category I may be difficult to detect in individuals with dark skin tones. May indicate "at risk" persons.
PU02	PU-HAPU, Stg 2	Pressure ulcer was noted during hospital stay. International NPUAP-EPUAP Pressure Ulcer Definition: Partial thickness. Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled or sero-sanguinous filled blister. Presents as a shiny or dry shallow ulcer without slough or bruising. This category should not be used to describe skin tears, tape burns, incontinence associated dermatitis, maceration or excoriation Bruising indicates deep tissue injury.
PU03	PU-HAPU, Stg 3	Pressure ulcer was noted during hospital stay. International NPUAP-EPUAP Pressure Ulcer Definition: Full thickness skin loss. Subcutaneous fat may be visible but bone, tendon or muscle are not exposed. Slough may be present but does not obscure the depth of tissue loss. May include undermining and tunneling. The depth of a Category/Stage III pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput, and malleolus do not have (adipose) subcutaneous tissue and Category/Stage III ulcers can be shallow. In contrast, areas of significant adiposity can develop extremely deep Category/Stage III pressure ulcers. Bone/tendon is not visible or directly palpable.
PU04	PU-HAPU, Stg 4	Pressure ulcer was noted during hospital stay. International NPUAP-EPUAP Pressure Ulcer Definition: Full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present. Often includes undermining and tunneling. The depth of a Category/Stage IV pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have (adipose) subcutaneous tissue and these ulcers can be shallow. Category/Stage IV ulcers can extend into muscle and/or supporting structures (e.g., fascia, tendon or joint capsule) making osteomyelitis or osteitis likely to occur. Exposed bone/muscle is visible or directly palpable.
source: S. X. Martinez (personal communication, May 6, 2016)		

Table 4. *Glossary of Terms*

Terminology	Operational Definition
Overtime	Pay above base rate of pay; defined by Fair Labor Standards Act (FLSA) and/or contract provisions Data source: HiFi
Premium pay	synonymous to overtime
Non-holiday overtime	Overtime pay that excludes legally or contractually defined holidays that incur an elevated pay rate Data source: HiFi
Overtime as a percentage of productive hours	Derivative of the formula: overtime hours / productive hours for a defined period of time. Data source: HiFi
Productive hours	Direct care hours Metric excludes sick, training, vacation, holiday, and other (e.g. jury duty) hours Data source: HiFi
Non-productive hours	Metric includes sick, training, vacation, holiday, and other (e.g. jury duty) hours Data source: HiFi
Nurse-sensitive indicators	Patient outcome measures (falls, Central line blood stream infections, medication administration errors, hospital acquired pressure ulcers) typically associated with direct nursing care Extraction from the KP Midas management risk system to include the following relevant codes: FALL 01-08, IC03, MED05, PU01-06, PU14 and to be limited to the acute care setting

Appendix AAG

Readiness Assessment: Improving safe care delivery through web-based hospital scheduling and staffing technology

Q1 Age

- <30 (1)
- 30-35 (2)
- 36-40 (3)
- 41-45 (4)
- 46-50 (5)
- 51-55 (6)
- >55 (7)

Q2 Identified Gender

- Male (1)
- Female (2)

Q3 Professional Role

- Registered Nurse (direct caregiver) (1)
- Patient Care Technician (2)
- Unit Assistant (3)
- Respiratory Care Practitioner (4)
- Support Service Representative (SSR) (5)
- Information Technology (IT) (6)
- Staffing Office Leader (SOM, Supervisor) (7)
- Nurse Leader (Director, NM, ANM, House Supervisor) (8)
- Other (9)

Q4 The current system (ANSOS) is easy to learn

- Strongly disagree (1)
- Disagree (2)
- Somewhat disagree (3)
- Neither agree nor disagree (4)
- Somewhat agree (5)
- Strongly agree (6)

Q5 The new system (KP Schedule) is easy to learn

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q6 It is convenient for me as an end user to access my work schedule in ANSOS

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q7 It is convenient for me as an end user to access my work schedule in KP Schedule

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q8 The end user has self-service features (e.g. able to request time off, submit availability for extra shifts and trades) in ANSOS

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q9 The end user has self-service features (e.g. able to request time off, submit availability for extra shifts and trades) in KP Schedule

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q10 In ANSOS, the end user is easily able to view their schedule and see "real-time" processing updates

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q11 The end user is easily able to view their schedule in KP Schedule and see "real-time" processing updates

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q12 The schedule codes in ANSOS are easily understood

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q13 The schedule codes in KP Schedule are easily understood

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q14 The training adequately prepared me to move to KP Schedule

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q16 I think KP Schedule will save me time.

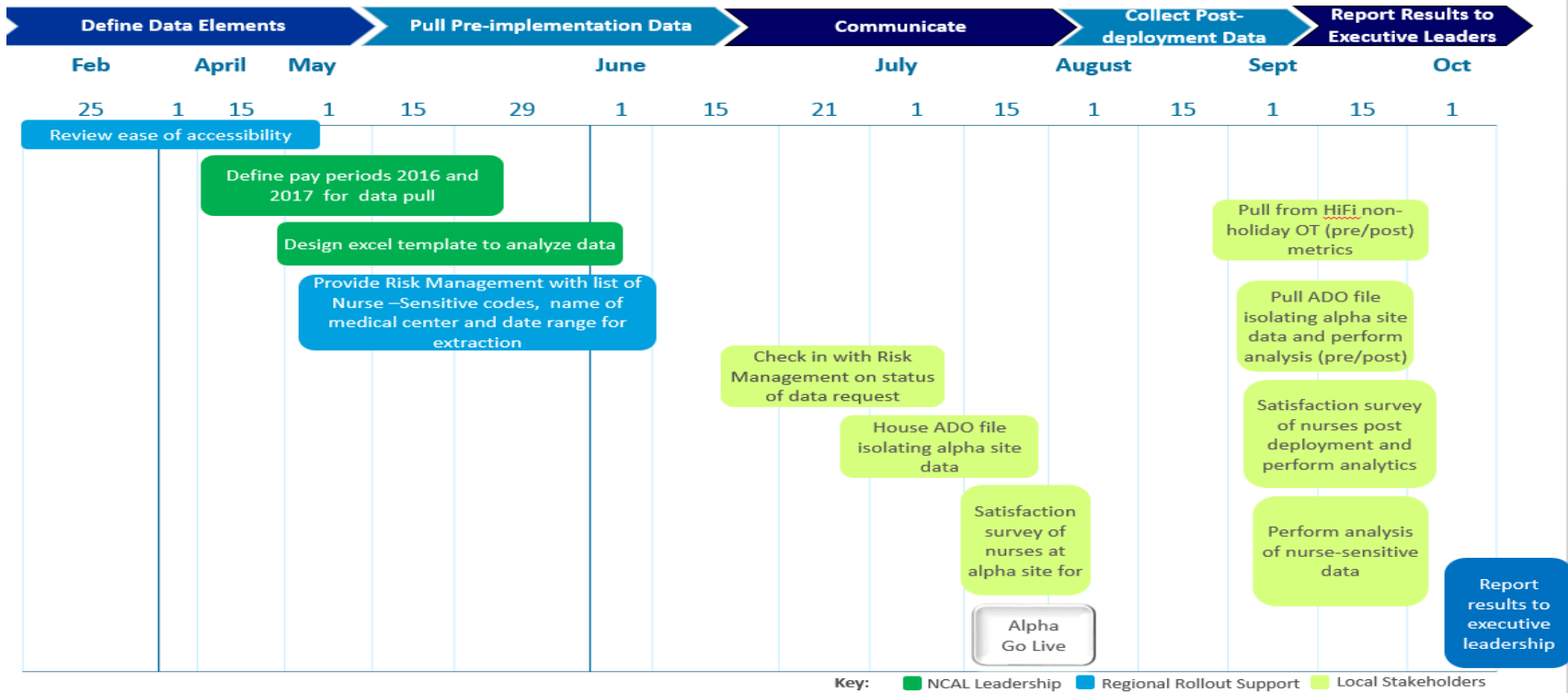
- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q15 Write one word that reflects your experience with the KP Schedule training

Appendix AAH

Data Management: Timeline

A management cascade for formative reporting



Data Management Timeline

Appendix AAI



Re: Request for access to de-identified nurse sensitive indicators
 Maryjo Williams to: Lisa J Massarweh
 Cc: Celia A Ryan, Lori O'Rourke, Silvia X Martinez 07/05/2016 04:49 PM

Lisa - I am happy to support your work. I don't think I need to approve your request, since you specific bedded units only, but I definitely applaud your desire to move us away from ANSOS to a system that will be more current and easy to use. thanks

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 Fax: (510) 873-5069
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 Email: natalie.a.evans@kp.org



Lisa J Massarweh Hi Celia and Maryjo, I am in USF's DNP program... 07/05/2016 03:09:34 PM

From: Lisa J Massarweh/CA/KAIPERM
 To: Celia A Ryan/CA/KAIPERM, Maryjo Williams/CA/KAIPERM
 Cc: Silvia X Martinez/CA/KAIPERM@KAIPERM, Lori O'Rourke/PO/KAIPERM@KAIPERM
 Date: 07/05/2016 03:09 PM
 Subject: Request for access to de-identified nurse sensitive indicators



Hi Celia and Maryjo,

I am in USF's DNP program with an anticipated completion date in August 2017. Part of the curriculum is to implement a significant project and contribute to the body of nursing.

With the full support of the company I am actively working to sunset ANSOS OneStaff (our 30-year old KFH scheduling and staffing system) and deploying a web-based application. Theresa Brodrick is my executive sponsor and the 3rd chair on my DNP committee. This is a non-research based project. I would be looking at pre/post measures of nurse sensitive indicators, staff satisfaction, and non-holiday RN overtime as outlined in my draft non-research statement of determination (see attached).

Silvia advised me that I need your approval to have access to de-identified high nurse-sensitive indicators

(data from MIDAS to measure nurse-sensitive measures provided by risk management department (FALL01-08, IC03, MED05, PU01-06, PU14). Specifically, I would want baseline data at a medical center level from KFH bedded units as well as 3 months after system implementation. We have a proposed medical center waterfall cascade for deployment if you would require it.

Please let me know if you'd like to meet to discuss this exciting work to bring us to the 21st century. Also, please let me know that you are okay with me working with Silvia and Lori to have access to de-identified data as I get closer to implementation. I will imagine at some point, a published manuscript will follow.

(attachment 'N749 Massarweh_DRAFT Statement of Non-Research DeterminationForm_2016-04-24.doc' deleted by Maryjo Williams/CA/KAIPERM)

Thank you for your support in leading nursing care.

Lisa

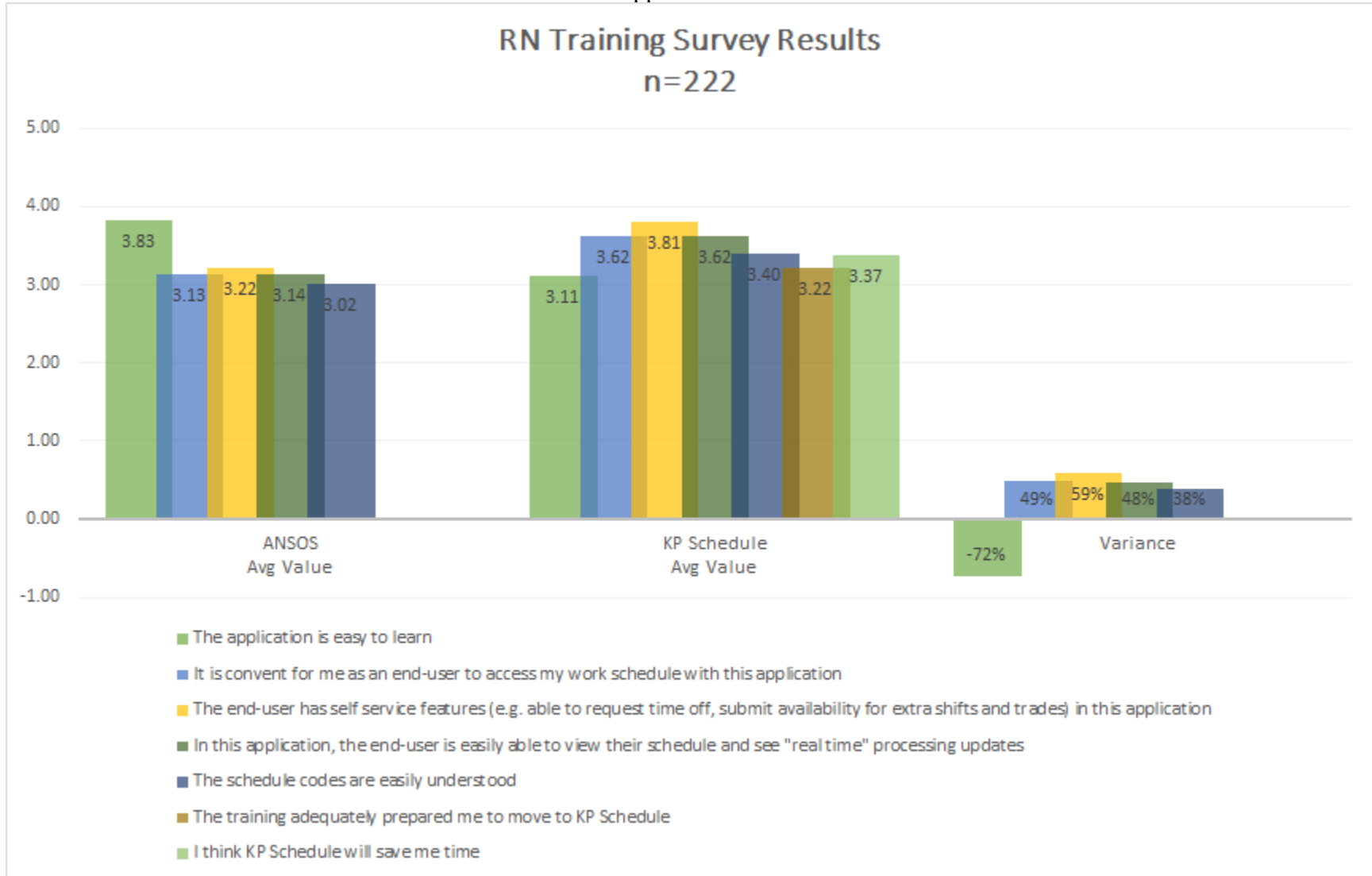
Lisa J Massarweh
 Director, PCS Financial Performance & Staffing Operations
 RWJ Foundation Executive Nurse Fellow (2006-9)

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Appendix AAJ



Survey Results- RN Respondents: Mean Likert Item Value and Variance

