

Management Analytics Program Development in Kitsap County

By: Gregory Waggoner, Galina Adams, Stella Vardanyan, Parker Hallof

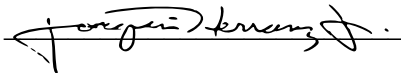
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A handwritten signature in black ink, appearing to read "Joaquín Herranz, Jr.", written over a horizontal line.

Professor Joaquín Herranz, Jr., PhD

Management Analytics Program Development

Kitsap County Department of Community Development



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ABBREVIATIONS AND TERMS

DCD - Department of Community Development

KC - Kitsap County

KCDCD - Kitsap County Department of Community Development

KPI - Key Performance Indicator

LEAN Principles - Creating more value while minimizing waste.

Power BI - A data visualization and analytics service produced by Microsoft.

EXECUTIVE SUMMARY

Background

The Kitsap County Department of Community Development (KCDCD) launched a Management Analytics Program in 2018 to transform their business from an analog process into a digital, data-driven organization. Part of this process has been the creation of Power BI dashboard visualizations to help staff, executive leadership, and external stakeholders better understand the permitting process from beginning to end. Dashboard visuals are a graphical interface tool that allow the user to analyze key performance indicators at a glance. Currently, some dashboards are used by only one staff member, many are not used at all, and others are too difficult to understand which makes them less useful and even disruptive to the overall organization compared to manually checking the information in the main permitting database.

Introduction

To address the lack of dashboard usage, KCDCD asked our student consulting team to design and implement three Power BI dashboards that will help the organization inform their customers, staff, and executive leadership about critical aspects of the permitting process. The goal for each dashboard is to create visualizations that are simple, valuable, and easily understood by each audience. To this end, the students conducted a series of focus-group interviews with each audience to determine what information is most useful to them, how that information is currently presented, and how they would like that information to be presented in the future.

Findings

One key finding is that internal staff do not have a common source for determining workflows and work assignments. Some staff retrieve this information directly from a database, others look for a daily email, and some use older dashboards.

Another finding is that external stakeholders (i.e. customers) are mainly interested in when their permits will complete review so that they can proceed with their projects. As such, information such as their permit's place in the queue, how many hours staff worked on their permit in the last week and estimated time to completion are valuable to stakeholders.

Lastly, executive leadership is mainly concerned with the sustainability and simplicity of the dashboards. As such, they are looking for a "master" dataset that can be automated and which is not dependent on an individual staff member maintaining the data.

Recommendations

To keep the dashboards sustainable in the long term, we recommend that they are refreshed regularly and supplemented with biannual meetings with staff to keep them relevant. This is an iterative process that KCDCD has long implemented through the agency's LEAN principles that should continue into the future. Staff productivity will continue to climb so long as they are engaged as a part of the design and implementation process.

Chapter 1: INTRODUCTION

1.1 Project Overview

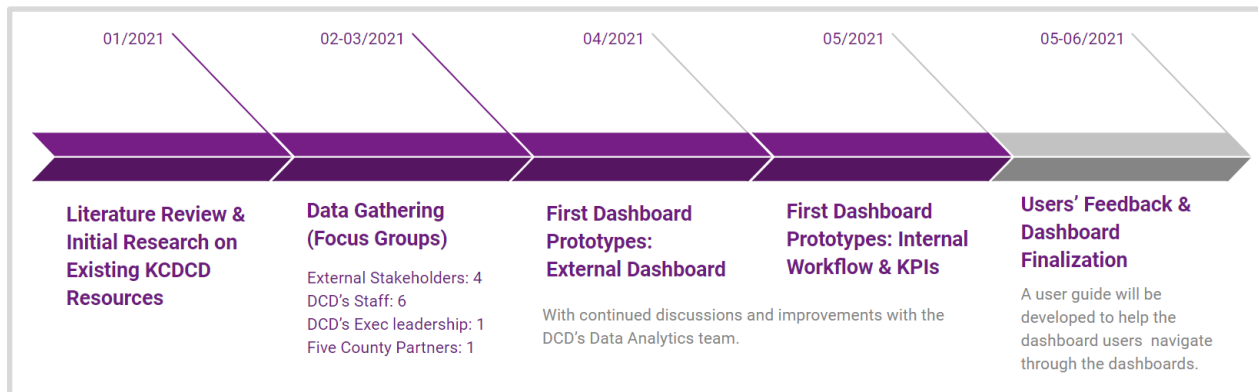
The Kitsap County Department of Community Development (KCDCD) is preparing for increased demand for permitting services due to rapid growth in its service area. As a result, KCDCD is creating automated reporting mechanisms and visual dashboards to aid data-driven decisions on resources, strategic initiatives, forecasting, and publishing consistent information to the public.

KCDCD currently has 24 different dashboards, each of which presents different sets of data. None of the existing dashboards are currently used by staff due to several issues with the data structure. These issues were identified during focus groups with staff; some are consistent and described in KCDCD's Management Analytics Program as well.

- **The data is inconsistent** between published reports or dashboards. Focus groups and conversations with staff have shown that the same metrics on multiple dashboards have different values even though they are from the same source.
- **Dashboards are hard to navigate** for staff members, executive leadership, and external stakeholders. This is partially due to a skill gap surrounding the use and navigation of Power BI dashboards, exacerbated by the lack of guidelines and instructions for users.
- There is **no centralized source for daily tasks**. As such, it can be unclear to staff who will be doing what work and when, which causes confusion amongst stakeholders, staff, and management.
- Dashboard **maintenance and updates are not regular or consistent**. Some dashboards are automated and refreshed daily while others are manually updated and can go weeks without being refreshed.
- Some **dashboard information is repetitive and unclear**, which leads to distrust in the dashboards and reduces user uptake.

The consultant team considered the aforementioned issues and created three new automated reporting mechanisms and visual dashboards to replace the existing dashboards. The team also suggested key performance indicators (KPIs) for the Department to track progress. Figure 1 presents the project's timeline.

Figure 1. Project Timeline



1.2 Client's Objective and Research Question

Client's Objective

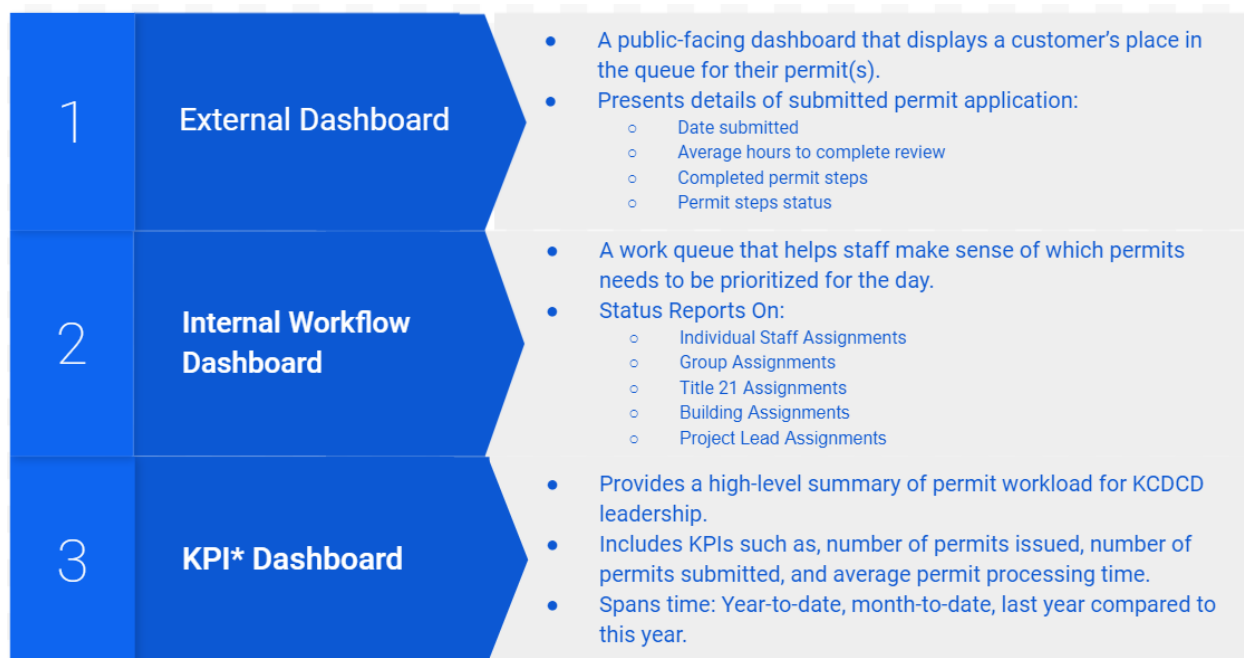
The primary objective of this project is to enhance KCDCD's Management Analytics Program by creating Power BI dashboards that display permitting data in a consistent and consolidated way to better inform stakeholders, leadership decisions, and workload management.

One tool that will better inform all parties is the creation of a permit queue. External users and teams within KCDCD define and conceptualize their individual and team 'queues' differently. This leads to complications in reporting to the public where their individual permit is among all permits that are currently in KCDCD's permit review queue. At a basic level, here are the distinctions between each permit queue:

- External Queue: Position in line based on the permit number.
- Internal Queue: What work is assigned to individual staff members AND what work is assigned to each team.
- KPI Queue: Overall permit workload.

Below are the description of the three dashboards that we created:

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* Key Performance Indicator (KPI): Critical indicators of progress towards an end goal that can be used to evaluate the performance of the work performed to reach that goal. (Per Kpi.org)

In addition to building the three dashboards listed above for KCDCCD, we created a Power BI dashboard learning resource to help staff and external stakeholders understand and navigate the new dashboards and ensure successful implementation.

Research Question

The project seeks to answer the following research question: **what are the main components of effective dashboards** that effectively communicate permitting queues, internal workflows, and KPIs to community stakeholders, internal staff, and management? This primary question will be answered by the following sub-questions:

1. What are the best practices for communicating permitting data using visual dashboards?
2. What data do staff and external stakeholders (i.e., developers, builders) need to better inform their decisions and workload?
3. How does KCDCCD define success in delivering its key services and meeting the community's needs?
 - a. Which KPIs add the most value to the organization?
4. What keeps internal and external users engaged with dashboards for the long-term?

Chapter 2: LITERATURE REVIEW

Although the bulk of this project's finished product is technology-based, we conducted a literature review to define best practices related to Power BI dashboards, data visualization, and

fostering change and implementation strategies in the workplace. We also identified the criteria needed to create KPIs (Key Performance Indicators). KPIs are critical indicators of progress towards an end goal that can then be used to evaluate the performance of the work performed to reach that goal¹. As such, few academic articles and books were reviewed and emphasis was placed on professional skill development and implementation.

2.1 Prior Evans School Capstone Projects

“Forecasting Single-Family Residential Permits in Unincorporated Kitsap County”

This capstone project aimed to forecast total Single-Family Residence (SFR) permit submissions for 2020-2021. It identifies the key economic factors that affect the permit applications and therefore informs Kitsap County’s budget and personnel allocations to the permitting processes. The literature review mainly includes economic forecasting reports. The authors conducted interviews and focus groups using the snowball method - a chain referral method of interviewing where one starts with a key informant who recommends someone to interview, who refers someone else until no new themes emerge in an interview². These snowball-method interviews and focus groups with various stakeholders informed our team’s interviewing processes.

“Designing and Implementing a Citywide Performance Dashboard”

This capstone helped the City of Tukwila design and implement a performance dashboard that helps track budget data and program effectiveness. The recommendations and literature review contain many concepts that helped our team. For instance, in 2019 there were six cities in WA State that had public-facing dashboards (Bellevue, Issaquah, Lakewood, Olympia, Seattle, and Tacoma). These cities’ dashboards informed our design decisions for the External Dashboard. Furthermore, the consultants for this project interviewed dashboard development staff at these cities to learn what makes a good dashboard and how to create effective dashboards for government use. Their interviews provided some best practices for data visualization and dashboard design that include:

- *Simplicity* - Simple dashboards are more effective than technically complex ones.
- *Color* - Color draws the eyes to details more strongly than shapes or text does.
- *Context* - Effective dashboards use context to tell a story (visually).
- *Accessibility* - Dashboards should be accessible for all audiences.
- *Presentation* - Placement and order of visualizations is essential for presentation.

“Washington Certified Creative Districts Data Collection and Tracking Dashboard”

This project helped develop a monitoring and evaluation tool to assess the effectiveness and progress of Certified Creative Districts for the Washington State Arts Commission. While this project helped create a dashboard for the Arts Commission, most of their research and discussion was about how to best measure the performance of an arts district. As a result, most of the findings were not directly relevant to our project, but there are some general takeaways that we identified. For instance, their team conducted interviews with management to learn what key

¹ <https://kpi.org/KPI-Basics> is a short description of what KPIs are and how they can work.

² Bernard, H. Russel (2010). *Analyzing Qualitative Data: Systematic Approaches*

indicators were most useful for them. We used a similar focus group format in our interviews with executive leadership to learn about which KPIs were useful for a performance dashboard. While this team included some technical details on building dashboards, they used Microsoft Excel, so some of this material was irrelevant to our project since we worked with Power BI.

2.2 Definition of Key Performance Indicators

It is important to differentiate between “metric” and “indicators” before designing performance metrics or indicators. A metric is a measurement of business activity, such as a “number of new customers,” “average mean time between repair,” or “total sales”.

To assess organizational success it is important to compare the measures to the organization’s defined goals. A metric that measures activities against a goal is called a performance indicator. A properly designed performance indicator illustrates the organization’s strategy and measures the performance to the defined targets. In sum, performance indicators show how close the outputs are to the plan, “indicating” whether the organization is on course to achieve its strategic goals³.

There are six stages of a winning KPI methodology⁴:

1. *Getting the CEO and senior management committed to change:* upper management commitment is important to successfully develop and drive the KPIs.
2. *Up-skill in-house resources to manage the KPI project:* trained and assigned staff is a determining factor for the KPI project’s success.
3. *Leading and selling change*
4. *Identifying the right KPIs:* Determining the right critical success factors helps to find all important performance measures—the winning KPIs. Limit to 5-8 success factors.
5. *Determining measures that will work in your organization:* Discussions and workshops should be held with senior management and staff, reviewing the company's archive and reports to determine the right measures.
6. *Get the measures to drive performance:* To get measures to drive performance, a reporting framework needs to be developed at all levels within the organization.

We conducted research on which KPIs are typically used by organizations in their reports on permitting and organizations running well-developed dashboards. The *National Association of Home Builders* uses a number of single and multifamily permits to present the building permits by states. They present a comparison of current month statistics with the same month in the previous year and percentage change, as well as the number of permits for the most recent year.

³ Eckerson, W. (2011). *Performance dashboards measuring, monitoring, and managing your business* (2nd ed., Finance professional collection). Hoboken, N.J.: J. Wiley & Sons.

⁴ Parmenter, David. *Key Performance Indicators: Developing, Implementing, and Using Winning KPIs*, John Wiley & Sons, Incorporated, 2015.

Transportation departments are tracking “average payment cycle”, “delayed projects”, “transaction processing” which can be transferable for permits and can be useful for the KCDC leadership dashboard⁵.

Insurance companies’ KPIs also can be transferable to our project purposes. One of the examples⁶ of their dashboards is tracking “open, new, in progress, outstanding and assigned complaints”, which were similar indicators to what we used for our project. Additionally, they categorize the “open complaints by priority” by tracking the ones that need immediate attention. We used a similar prioritization metric in our Internal and KPI Dashboards.

2.3 Best Practices - How to Create Effective Data Dashboards?

There are many resources available to research best practices for data visualization. Some are business or management sources taken directly from industry, while others are more educational through consulting firms or online learning websites (e.g., Lynda.com). Regardless of the source, the best practices for data visualization are interdisciplinary and involve fields such as art, data management, business intelligence, change management, and storytelling.

One helpful online resource comes from Datapine⁷, a company that helps facilitate data analytics through technical innovation. Their blog post titled “*20 Dashboard Design Principles & Best Practices to Enhance Your Data Analysis*”⁸ lists the principles and tips for creating dashboards. The information is very practical and helped guide some of our design decisions. The picture below provides an effective visual summary of each principle.

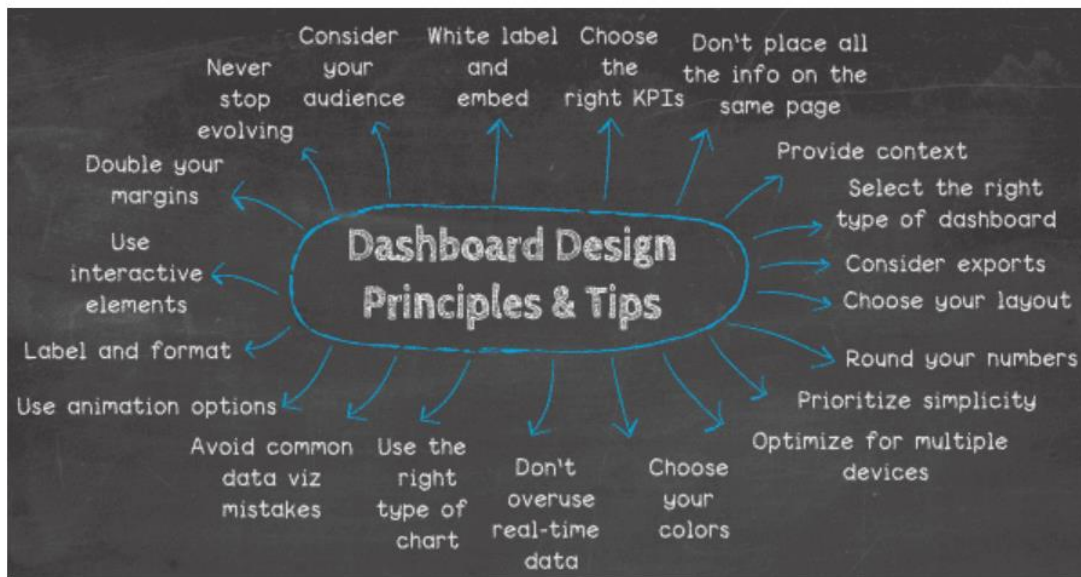
⁵ <http://www.tib.wa.gov/performance/Performance.cfm>

⁶ <https://enterprisedna.co/power-bi-showcase> links to a showcase of sample Power BI dashboards created by consulting firm Enterprise DNA.

⁷ <https://www.datapine.com/about-us> explains some background about the company and what services their company offers.

⁸ <https://www.datapine.com/blog/dashboard-design-principles-and-best-practices/> links to a collection of articles that teach readers essential design principles and best practices for dashboards.

Figure 3. Dashboard Design Principles and Tips



Source: <https://www.datapine.com/blog/dashboard-design-principles-and-best-practices/>

Another valuable resource was the book “*Storytelling with Data: A Data Visualization Guide for Business Professionals*” by Cole Nussbaumer Knaflic. Like other resources, this book helped inform our data and data visualization decisions. One particularly valuable lesson was to keep the visualizations simple and tailored to your audience. The downfall of many visualizations is that they are designed to include excessive information that makes them complex to understand for the user. We include this information later in our Methodology chapter.

2.4 How to Foster Change in Organizations

Software Change Management: Case Studies and Practical Advice

There are always roadblocks when introducing new software into the workplace and the most difficult to overcome is staff comfort with their current workflows. The Status quo is comfortable and people do not like change. Kitsap’s leadership team considers their department an efficient trailblazer and wants to continue to keep their operations lean. There may be concerns that the rest of the office does not share their zeal to continually change or alter their work culture.

Flowing from that are concerns that the change is being mandated from senior leaders with no support from their staff. Workload changes often fail when they have enthusiasm for change at the top but the passion is not shared with frontline staff. Frontline staff may resist changes that feel forced from on-high with little consideration for their opinions on how it will affect their workflows.

The final concern is Organizational Structures that do not facilitate teamwork and cooperation. Different organizations and offices have different cultures and some operate with higher levels of teamwork and cooperation than others. Those with more individualistic groups are prone to shutting out changes from people they do not feel “connected to”.

The best strategy to keep staff engaged with and open to new software is to follow the KISS Principals: Keep it Simple and Straightforward. Stakeholders at all levels are confused and off-put very quickly when faced with data visuals that they do not understand. Charts and graphs should be kept as simple as possible and relate only the information needed for a few topics. Trying to tell the *entire* story can often tell *none* of it.

Chapter 3: METHODOLOGY

Introduction

Here we describe the methods chosen for this project and our justifications of those choices. A literature review was needed to establish benchmarks on how dashboards are typically used by small public sector agencies and both private and public sector insight on how to best design dashboards to maximize user accessibility. We also reviewed and analyzed other county permitting office dashboards for further comparison and research. Finally, our primary stakeholder data collection came in the form of several group interviews with members of KCDCD staff, KCDCD leaders, local developers, and a regional 5-County Alliance of permit offices.

To build a dashboard that will help streamline KCDCD's outputs, it is necessary to map out the agency's problems and then ascertain which ones can be alleviated or at least helped. While the final product solely involves the quantitative data they have on permits, determining which parts of that data are most needed and how best to display them is entirely qualitative. Stakeholders both internal to KCDCD and external (developers and other users) were interviewed to determine what they wanted.

Sampling Strategy

We conducted quota sampling interviews with 2-3 people in each of the six departments to gather information on each department's perspective on dashboards. While we planned for a second round of key informant interviews to be conducted after the first round, we gathered sufficient information from our first round to skip this step. However, we provided our dashboards to everyone from these interviews for feedback on dashboard design and content.

Why this research design?

We chose to use interviews as the research question does not have a specific answer; it will be potentially inconsistent between groups and be highly subjective to several individual characteristics. KCDCD has tried several times in the past to build and use a dashboard in daily operations but has not obtained serious buy-in from staff.

To remedy this issue, we are interviewing staff from every department that will be using the dashboards to determine (1) what features would improve their workflow in their own minds and (2) why have past attempts to build and use a dashboard failed? Allowing staff the chance to be involved and describe why they did not find past models useful provided critical information.

Interview Process

We used the following methodology to conduct an organized and informative information generation process. Our interviews always involved at least three parties: our student team, the KCDCD Data Analytics Officer, and anywhere between one to nine interviewees, with the average number of interviewees being two. The interviews themselves were based around semi-structured questions to allow staff to describe more granular aspects of their workflow, interactions with other office departments, and interactions with external stakeholders. As this took place during the Covid-19 pandemic, all interviews were conducted via Zoom and recorded for our later use with the consent of all involved parties. Each member of our team took notes during the interviews which we later used to establish and determine where bottlenecks appeared in KCDCD's workflows that the dashboards could ameliorate.

Dashboard Prototyping

Based on the interviews and focus-group discussions, our later work focused on building three prototype dashboards and sharing them with relevant audience members: staff members from each KCDCD department, external stakeholders, and the KCDCD leadership team. We then used each audiences' feedback to further refine our dashboards. The prototypes here are the same three sets of dashboards described in the Introduction: an External, Internal, and KPI dashboard.

The dashboard prototyping process is based on the following steps:

1. Select the most important features for each dashboard that we uncovered from the interview and focus group discussion results.
2. Draft a Power BI dashboard based on the aforementioned items.
3. Conduct additional one-on-one interviews with relevant audiences to clarify measures if necessary.
4. Obtain feedback about the draft prototype from the relevant audience(s).
5. Finalize the dashboard based on the feedback.
6. Develop a user guide for each dashboard.

User-Focused

The Department's previous efforts to build and utilize dashboards did not result in much uptake from staff for reasons discussed previously (data inconsistency, old data) but they also were only partially designed with input from staff. Some dashboards were one-off designs made by singular employees for their individual use only, or they were designed by the tech team without asking the users (staff) what would make it useful for them. Others were designed after talking with the end users but were made too technically overwhelming for the staff or included too much information that they did not find useful.

Our project is unique in that it will be the first time the department has opted for a holistic, needs-based approach. Our strategy involves interviewing staff to find out what failed with past designs, what causes problems with their current workflows or decision processes, and what they would find most useful in a dashboard tool. The dashboards we designed were also sent back to staff throughout the capstone process to garner even more feedback from them. An iterative

process built around simplicity for the user is our holistic approach and the result was a tool designed by and for the users.

Ethics and Limitations

We acknowledge that this project has limitations and would like to discuss them along with the ethical considerations we made to ensure an accurate and inclusive data gathering process.

Transcription and all opinions: Every focus group interview conducted for the project was recorded. Although all participants consented beforehand to being recorded, we understand that the act of recording may influence a participants' opinion and limit their active participation. To attempt to prevent this, we stated that the recordings were to be used only to review particular discussion points to better articulate the information on the dashboards. We also stated that the recordings would be used only by the student consultants and would be deleted following project closure.

Control over the focus group discussions: The focus group discussions included at least 2-3 people from the same team or the field. We acknowledge that team members' opinions may influence the other team member's opinions or make them agree with the majority's opinions (i.e., Groupthink)⁹. Although at the beginning of each meeting we stated that the meeting is non-formal and intends to have healthy discussions on how to improve the staff or stakeholder experience, we acknowledge that we cannot fully eliminate this limitation.

Not all stakeholders or staff members provided input: KCDCD has 72 employees but only 16 members of staff participated in the focus group discussions, 7 of whom were senior leaders. Additionally, KCDCD contacted, scheduled, and selected who we included in the focus group interviews. We conducted separate interviews with the department data analyst who works more closely with other staff members and received a list of concerns/issues he gathered during his working time in KCDCD. We aimed to further diversify the perspectives we heard from during the data collection phase of the project.

Chapter 4: FINDINGS

Our initial findings are more qualitative than quantitative since our interview questions were intentionally open-ended to allow the interviewees and focus groups' participants speak more openly about their thoughts and experiences. As such, we highlight key takeaways from our conversations with approximately 30 interviewees. The order of our findings does not indicate their significance as they all provided equally valuable information to help guide our Power BI dashboard design decisions.

The "key takeaways" were decided in team meetings held after each interview. Themes and specifics were discussed and each team member's notes were compared to see what we

⁹ <https://ethicsunwrapped.utexas.edu/glossary/groupthink> is an article from the McCombs School of Business at UT Austin that describes how groupthink affects group dynamics.

collectively deemed “important”. Word clouds were generated in Atlas TI (see Appendix 3) using each of our interview notes to see what words appeared most frequently.

The following narrative analysis is broadly separated into four groups based on each group’s relationship or position with KCDCD. They are Executive leadership at KCDCD, Frontline staff within KCDCD, External stakeholders, and the 5 County Partners.

Executive Leadership

The KCDCD Executive leadership team has a high-level perspective on the problems encountered with past dashboards, potential problems with future dashboards, and valuable insight into what will help the new dashboards succeed in adding value for staff and customers alike. Executive leadership agreed that one master dataset is most likely essential as the foundation for the successful implementation of a dashboard system. This dataset would preferably be automated so staff does not have to spend time doing this themselves, adding valuable time to their workday for more important tasks. There are five key points that all the executive team mentioned as being crucial to the dashboard project:

- **Sustainability** is extremely important to Executive leadership. They want products that will last for years, as previous dashboards have only lasted months or were dependent on staff who then left or retired, taking their knowledge with them. To address this, all staff will need training and resources on how to use, navigate, and work with the dashboards to ensure complete understanding and sustainability of usage even in the event of staffing changes. Documentation should be provided as part of a continuous improvement process.
- **Simplicity** is key. Almost as important as the data itself is the ability for a user to draw the story out of the data with little effort or extra steps. Showing multiple indicators at once is overwhelming and off-putting, as are the wrong types of graphs and charts. The dashboards should provide a quick, clear reference. For example, indicators being “red, green, and yellow” for an easy understanding of status as “bad, good, at-risk”. Users should not have to click through multiple tabs or pages to get the information they need.
- **Usefulness** is important as people will be more likely to use something that makes their job easier. No matter how simple a dashboard is, it may become irrelevant without proper messaging on the usability and other benefits the dashboard provides staff. Messaging for the new dashboards will have to acknowledge that change is hard while highlighting the day-to-day benefits of adopting the dashboard over older methods. For example, why and how does this benefit staff? It is imperative to explain the added value, and this messaging will be key to gaining buy-in and sustained usage.
- **Predictability** for customers and **Consistency** in data. Current staff perception of dashboards is that the data they pull and present is highly fallible and therefore unreliable. Confidence in the data is needed to ensure customers and staff are always receiving the same information and not getting different answers to their questions depending on the source of the data used to inform them. Predictability and consistency are reliant on a reliable master source of data.
- **Audience-Specific Data** that would ideally be compartmentalized or categorized by user group. For instance, staff needs to know: what are today’s tasks, what was accomplished yesterday, what are the status of permits assigned to them? The consensus among the

executive leadership for the highest customer need was for them to know where their permit was in the queue. There is, however, a careful balance that needs to be struck for an outward facing dashboard between providing just the right amount of information instead of too much. Too much information may cause excess meddling by customers in the permit review process and burden staff.

Frontline Staff

We conducted six focus group discussions with key KCDCD employees involved in the permitting process. These six groups were: permit technicians, plans examiners, development engineering, construction inspectors, environmental planners, and land use planners. Although there were some variations among the interviewees' job functions and daily barriers they face, all of them shared common concerns and needs for the new dashboard and its functionality. We summarize our key findings from these discussions below:

Data consistency: Currently, the ad-hoc reports generated by different employees and existing dashboards are not consistent with each other and present conflicting data. This causes mistrust toward the data in the dashboards and leads staff to avoid using the existing dashboards in favor of manually searching through the data to try to find whatever they need. Almost all of the interviewees mentioned the importance of one source for all the reports and dashboards and the importance of their regular updates with alerts to notify if an update is not done on time.

Dashboards' simplicity and ease of use: The existing dashboards are hard to navigate for employees as there are no guidelines or explanations of the dashboards' purposes. In addition, employees have different levels of technology-related skills so it is important to keep the dashboards and the guidelines simple enough that all the employees can easily understand and use them.

The importance of employee buy-in: Previously, the dashboards were mainly developed without employees' input which is one of the reasons that employees do not use them. Understanding employee needs and having their direct input and feedback at the beginning will help to have their buy-in in order to ensure the successful use of the dashboards.

Staff needs from the dashboard: Having a one-stop shop to review their daily work and priorities is key for all frontline employees. In this singular location (which will be a dashboard) employees expect to see:

- The number of assigned permits to each inspector: This will include priorities and details on when it is submitted, type, who already looked at it (current status/stage), and which steps needed to be finished.
- Permit days in review: It is extremely important for all frontline staff and their supervisors to know the permit time in queue as it will help to prevent the projects from running longer than the average review time and allow for proactive conversations with the customer if the permit will take longer to review (e.g., trending up). Being transparent by making the permit review times and steps available to the public will reduce the amount of time staff spends of answering public queries significantly.
- Number of resubmittals: After reviewing the permit application, the staff sometimes

needs extra documents to issue the permit. Thus, the applicant may be required to resubmit missing documents and staff wants to keep track of these documents.

- Trends: To show the numbers of permits submitted (monthly/ quarterly/ annually), the average time of reviewing will help the department to keep track of their activities.
- Some employees mentioned that seeing the number of permits reviewed (weekly) by each inspector and the review time will help them to recognize their accomplishments and keep them motivated.

Better communication with the departments regarding permit review: The absence of a clear communication mechanism within the teams working on permits makes the permit review process more difficult, which contributes to long permit review times. Although this project does not intend to create better communication channels between different departments, some interviewees believe that showing on the dashboard the steps finished by each team and any comments they made for a specific permit will ease their workload as they will know whom to contact if needed.

Learning methods: The interviewees' answers varied to the question of the most effective way of learning to use a new dashboard. Most agreed that visual learning methods (i.e., videos) explaining and showing how to use the dashboard are the most effective. One interviewee mentioned that learning directly from the dashboard is the best (i.e., each line on the dashboard explains its function when you hover on it). Some interviewees also suggested that having a document with short bullet points explaining the steps of working with the dashboard and its functionality would be the most helpful.

External Stakeholders

Where in the world is my permit? The central theme across four interviews with four separate developers and other external stakeholders was the desire to know where their permit was in the queue. As reported in our interviews with KCDCD staff, members of the public call in constantly trying to get information on:

- When will they get their permit back?
- Has their permit been looked at?
- What can clients do to speed it along?

Major developers are more familiar with KCDCD staff and often more likely to know who can give them the information they are looking for. However, average builders or homeowners will often cold call the department until they find someone to answer their questions. Some members of staff told us that upwards of four hours of their day can be spent answering these types of questions, which they feel is a lot of valuable time not spent working on reviewing permits.

Developer desires: Many of the developers we talked with admitted that they will always push for more information from KCDCD. However, they did state that they would be dramatically less inclined to call KCDCD staff if:

- There was a dashboard or other indicator online that would tell them whether or not their

permit had even been reviewed yet. Knowing if the staff has started working on their permit is the main question clients have.

- The second takeaway for repeat developers is that they would like to know how many permits were being processed daily/weekly/monthly, to indicate how swiftly the “queue” is moving along. In addition to knowing if the permit has been viewed at all, there was a very strong indication that this would reduce the amount of staff time that they use up asking these questions. Furthermore, it would give them better peace of mind to at least know where KCDCD is in the process and reduce the pressure they have placed on them from their stakeholders.

Repeat versus single-use customers: Most of the perspectives we were able to observe were from mainstream, repeat developers. While they made up the lion’s share of permits that KCDCD has to process, the majority of call-ins that KCDCD received were from single-use “mom and pop” type customers. Their questions and issues had more to do with how to upload documents, wondering if they needed a permit for X or Y, or design assistance as opposed to the “place in queue questions”. Single use customers are frequently one-time users of KCDCD’s services and are not familiar with the intricacies of KCDCD’s workload.

It was recommended by the developers that we spoke with that this type of information should be made as easy to find as possible to better their experience of the permitting process. It was also assumed that this would likely reduce the number of call-ins from the public to permit planners and technicians if the most common and frequent of questions were made available to them in a clear and easy to find manner.

5 County Partners

5 County Partners is a collective of permitting staff from five counties¹⁰ in the Puget Sound region that frequently works together. This partnership allows them to share expertise, discuss industry trends, and permit-related developments in their communities.

One key takeaway from this group is that their customers’ most common question is how soon their permit will complete review. While it may seem obvious, this additional confirmation shows the importance for us to include some sort of position indicator in our external-facing stakeholder dashboard.

Another key takeaway is that there is no industry standard for managing workflows; each agency has its own process and software for processing permits. While this does not show us a common solution for visualizing workflows, it does show different methods that we may use to create a solution.

The other county offices also mentioned their concern for balancing permit-process transparency with placing barriers between staff and the public so that they can maximize the amount of time they spend reviewing permits. On one hand there is an expectation that the government should be more transparent with the public, but there is also a concern for protecting staffs’ contact information from being widely shared. This balance is important for our client as interviews with

¹⁰ Kitsap, King, Snohomish, Pierce, and Jefferson counties are the members.

KCDCD permitting staff showed that a large percentage of each workday can be taken up by phone calls from permitting customers. Overall, this - in combination with our interviews with KCDCD leadership - will inform how transparent we make the permitting process in our external-facing stakeholder dashboard.

Our final takeaway from this group of interviews was how to decide which KPIs to include in the KPI dashboard. Pierce County has a public webpage¹¹ displaying the KPIs that they track, which then link to dashboards for each KPI. This format of having a master webpage link to more specific information could help us visualize information in a friendly manner at first with the option to display details for those who want that. We also received reinforcement that color-coding with green, yellow, and red is the most intuitive way to communicate KPI status to users. On the design-philosophy side, we learned about the importance of considering whether a KPI is actually meaningful or just fluff. This can influence if people will use a dashboard or not and is critically important to consider for our design principles.

Chapter 5: RESULTS

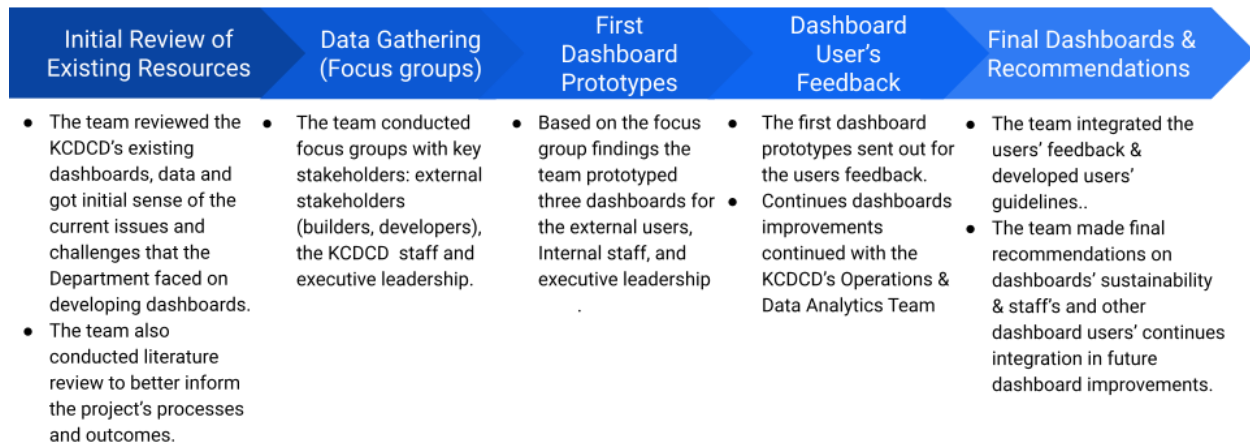
In this section we show screenshots of our finished dashboards with short descriptions of their respective design philosophies based on feedback from staff and stakeholders. In general, we designed each dashboard with simplicity in mind, beginning with high-level summary information and presenting the option for a deeper dive into the data for those that want it. Please see *Appendix 4* for our initial design outlines using Miro Whiteboard and *Appendix 5* for our earlier drafts to see what changes we made over time.

Regardless of the audience, the expected impacts of our dashboards are improved understanding, simplicity, and reliability of the information that each dashboard presents. More specific benefits for each dashboard are included in their short description.

The team used the process described in Figure 4 to achieve the project's goals and ensure the intended results.

¹¹ <https://internal.open.piercecountywa.gov/stories/s/gxni-8y4g> shows a summary of all the Planning, Building, and Maintenance metrics that Pierce County tracks.

Figure 4. Project Process Description



External Dashboard

Figure 5. External Dashboard

Enter your permit number to find your place in the queue

20-01731

Hillsdale Preliminary Plat - Preliminary Plat submittal for 30 residential lots

Reviewing Resub

218
Days in Review

6/15/2020
Date Review Started

348
Average Days to Review Your Permit Type

Your permit is number 40 out of 527 permits in review

Permit Steps

Step	Step Status	Latest Begin Date	Assigned To
APP SUBMITTED	AP		PERMIT TECHS
COMPLETENESS REVIEW-LS	AP	6/10/2020	
DECISION	PEND	8/5/2020	HE CLERK
ENVIRONMENTAL	PEND	8/20/2020	Colin Poff
FIRE MARSHAL	AP		FIRE MARSHAL, Gregory Gentile
HEALTH DISTRICT	AP	7/8/2020	Kerrie Yanda
INFO REQUEST REVIEW	PEND		QUALITY REVIEW
NOA	AP	7/20/2020	Jeff Smith
NOA DISTR	AP		OFFICE ASSISTANTS
PERMIT CENTER	AP		
PERMIT CLOSE OUT	PEND		Meg Sands

Visit KCDCD's Homepage

Apply for a Permit

Make a Payment

View Inspection Results

Permit Services & Resources

Informational Forms & Brochures

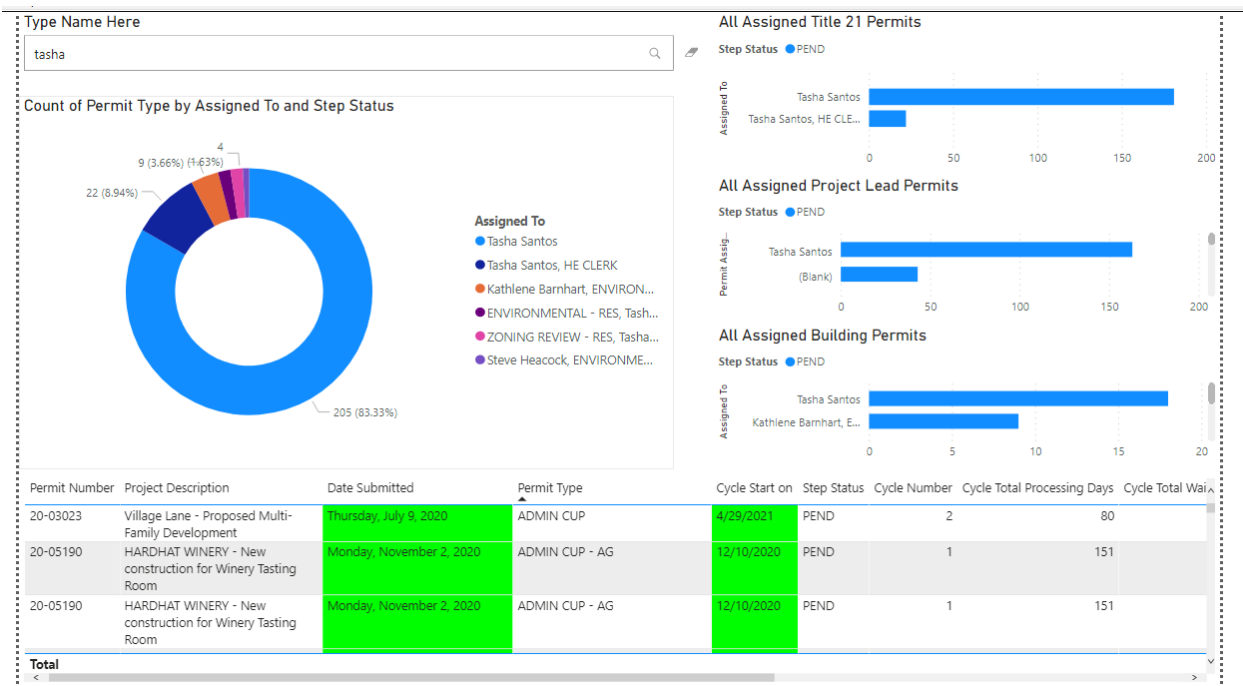
As previously mentioned, the external dashboard's purpose is to facilitate communication surrounding commonly asked questions to KCDCD's customers so that staff are free to work on the permit review and issuance process. The user begins by inputting their individual permit number and is then presented with permit specific details such as how many days their permit

has been in review, its date submitted, and the average days in review for their specific permit type (e.g., remodeling a deck or building a new house). Most important is the successful integration of the customer's place in the permit queue pipeline. This was a highly requested feature and allows the customer to get a sense of KCD CD's workload and a rough estimate of when their permit will complete review.

One expected impact of this dashboard is reduced staff time spent answering questions about the progress on a customer's permit(s). On the flip side, this will also reduce the amount of time customers spend figuring out when their permit will be approved, which helps them plan their construction process and budget. Increasing data reliability and communication is another expected impact since both staff and customers will be referencing the same numbers.

Internal Workflow Dashboard

Figure 6. Internal Workflow Dashboard



The internal workflow dashboard was designed to show a staff member the high-level permitting information that would be most helpful to prioritize and manage their work, as requested during the focus groups.

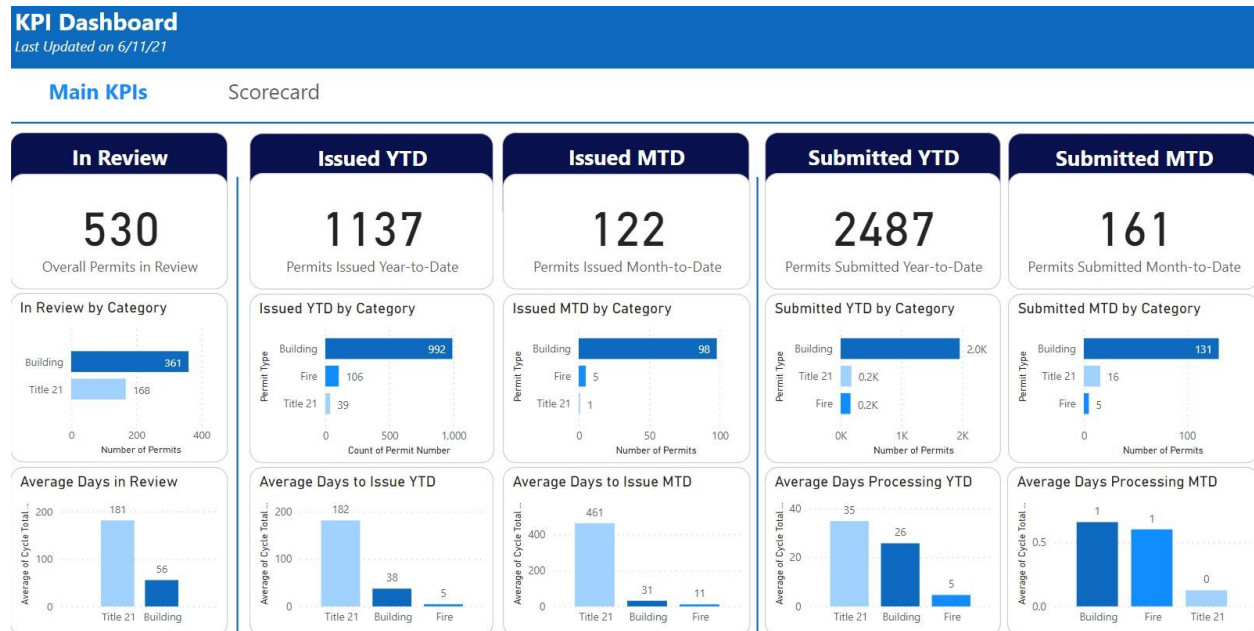
The staff member enters their name in the top left search bar, which will then populate visuals (donut, bar graphs, and the bottom table) with the permits assigned to their name.

- The donut graph on the left displays the total number of permits assigned to them broken up by which group the permit is assigned to. Some permits are assigned to groups of staff members when they are highly complex.
- The bar charts on the right break up the permits by the 'type' of permit.

- There are two different large categories of permit types; Title 21 permits, which are land use permits, and building permits.
- Each title 21 permit has a project lead, as these types of permits are often so large and technical that certain members of staff specialize in just one area. The project lead is charged with ensuring that each member of the work group stays on schedule and troubleshoots any problems.
- The bottom section of the table displays various bits of information related to each permit that staff told us they would need to see. There is a color-coding system to this table that communicates which permits are high priority items for staff to work on. KCDCD works on a first in first out principle for permits, so the older the permit the higher the priority.
 - Permits are highlighted either green, yellow, or red.
 - Green means the permit is a low priority.
 - Yellow means the permit is a medium priority.
 - Red means the permit is a high priority.

Key Performance Indicators Dashboard

Figure 7. KPI and Scorecard Dashboard

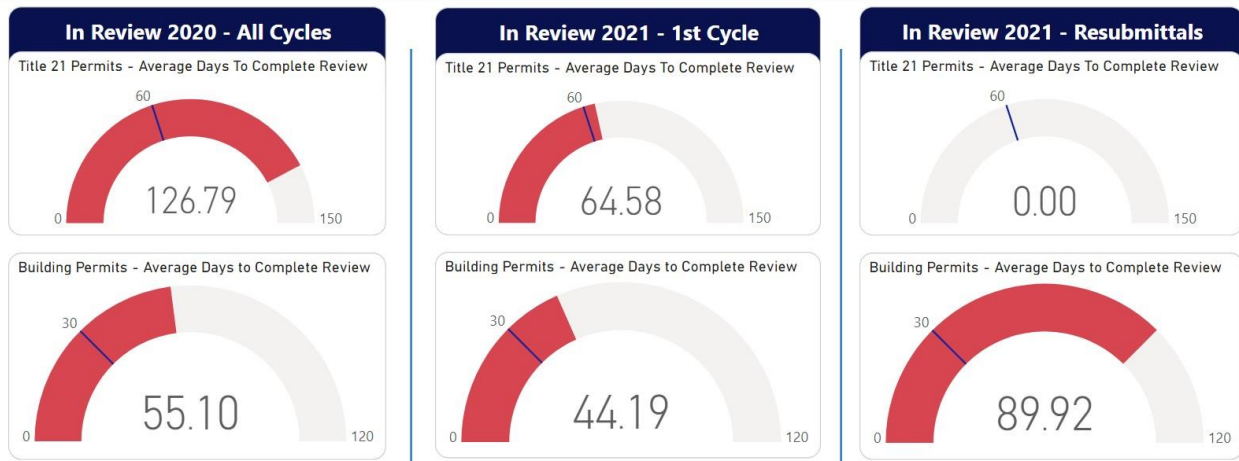


KPI Dashboard

Last Updated on 5/10/21

Main KPIs

Scorecard

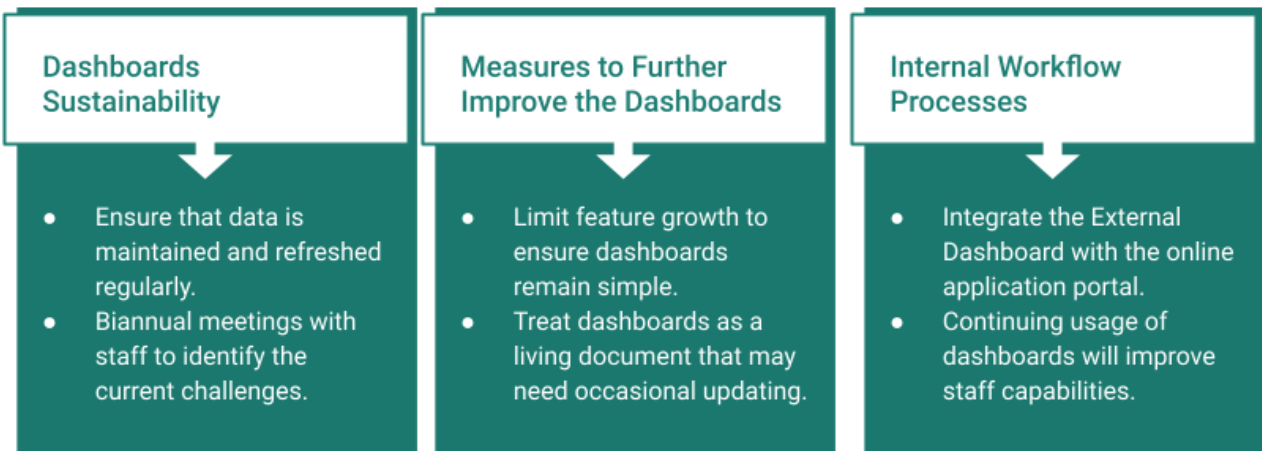


The KPI dashboard was created to help KCDCD leadership view high-level summary information of key performance metrics for permits last year, this year, and this month. It includes the overall amount of permits currently in review, the number of permits that have been issued, and the number of permits that have been submitted. Each overall number is broken down into the department's three major categories of permits: building, title 21, and fire. This was done because title 21 permits are technically complex and take much longer to complete than standard building permits, while fire permits are relatively easier and take little time to complete review. The expected impact of this dashboard is that it will help inform leadership's decision making through data accuracy, reliability, and sustainability.

Chapter 6: RECOMMENDATIONS

In this chapter, we describe the set of recommendations summarized in Figure 8 that will help KCDCD address dashboard sustainability, future dashboard improvements, and internal workflow issues. Our recommendations are based on general data visualization actions and also internal workflow processes that reflect the organization's culture around Lean Six Sigma.

Figure 8. Recommendations



Dashboard Sustainability

One of the reasons that the staff did not use the previous dashboards was data inconsistency and infrequent data refreshing. For this reason, we suggest KCDCD ensure that the data behind the newly created dashboards are well maintained. Although the data will refresh daily, we recommend periodically checking if the updates are done on time and if data columns are populating properly.

To ensure long-term dashboard usage KCDCD should also prioritize staff engagement. The majority of the staff members did not know about the existing dashboards, which means that previously, the staff was not involved enough in the dashboard creation processes. Although the newly created dashboards under this project are based on staff's needs and direct input, we recommend meeting with internal staff bi-annually, at a minimum, to keep the dashboards' design relevant to staff needs, as well as stay open to their feedback. Staff productivity and dashboard usage will increase if staff is engaged as part of the design and implementation process.

Dashboards Further Improvement

While these dashboards were created through multiple rounds of feedback and revisions, there will likely be future opportunities for improvement that KCDCD should take advantage of. One way to improve any dashboard is to limit the amount of additional information or features added to it. As such, KCDCD should have a small dashboard review team that determines what information or features are added or taken away based on user feedback. This team should consist of a technical expert, design expert, and workflow or process improvement expert.

Another recommendation is to treat all dashboards as a living document that will need changes to keep information accurate and reliable. These dashboards were created based on the needs and suggestions from staff and stakeholders in 2021 and it is likely that these needs will change over time. The aforementioned dashboard review team could review each dashboard every six months and ask if the information is still relevant, needs to be updated, or taken out entirely.

Internal Workflow Process Improvement

KCDCD has only recently moved the permitting process online and adapted to working remotely during Covid-19. The aim of our project was to design dashboard tools that can be used on a daily basis by staff members. As staff grow more comfortable with dashboards KCDCD will have more opportunities to build out these new skills and add new features to further streamline their workflows. For example, internal staff spoke of what they would want a personal assistant to do if they had one. Some of those wants were addressed by our project but others were not and would be great recommendations for future improvements/capstones.

Previous dashboard designs were not always accurate which led to staff not using them. Conducting regular workshops with staff that use the dashboards to discuss and identify potential usage problems, what works and what does not, as well as any updates or other data inconsistency problems will keep these novel ones accurate and applicable.

According to our interviews with the 5 County Group, KCDCD is ahead of the curve in Washington state for having moved the entire permitting process online. However, as has been noted throughout our report, it is easy to overwhelm users with overly complicated dashboards that contain too many visuals or excessive data. The internal dashboard's purpose is to improve staff's workflow and moving forward, KCDCD should keep this objective at the forefront of any discussions about how to improve or maintain the dashboards we have built. Keep it Simple and Straightforward (KISS).

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APPENDIX

Appendix 1: Kitsap County Department of Community Development

The Kitsap County's Department of Community Development (KCDCD) aims to partner resources that help residents achieve their land and building development goals while protecting their natural environment.¹² KCDCD's main services include:

- Administrative & Permit Services
- Building & Fire Safety
- Development Services & Engineering
- Planning & Environmental Programs

Permitting services compose the majority of the Department's work and revenue. The Department provides four permit types¹³ with the issued number of permits in 2020 as follows¹⁴:

- Residential - 2,479
- Fire - 224
- Commercial - 295
- Agriculture (TBD)

With KC's rapid growth in the coming years - as more residents leave the surrounding Puget Sound counties to enjoy Kitsap's relatively affordable housing market - the forecasted permit amounts are going to increase.

¹² KCDCD mission, retrieved from <https://www.kitsapgov.com/dcd/Pages/About-Us.aspx>

¹³ Document provided from Stanton Blonde "Permit types & Categories"

¹⁴ Building Permits Issued Activity. Retrieved March 01, 2021, from <https://bit.ly/2NH0dex>

Appendix 2: Interviews

Interview Questions

Management Analytics Program Development - Kitsap County Department of
Community Development

Student Consultants: Gregory Waggoner, Galina Adams, Stella Vardanyan, Parker Hallof

Research Question: What are the key elements that make a data dashboard useful to the staff at a county permit office?

Staff

1. Basic personal/work information: Name, Job Title, a short description of their job.
2. What does your aspect of the job look like?
3. What is your experience with using dashboards at KCD CD?
4. What do you think of the dashboards KCD CD has used in the past?
 - a. How did you use previous dashboards? What worked or didn't work? (any examples of dashboards you can mention)
 - i. If so, when did you stop?
 - ii. If not, what put you off from using it?
5. What information do you use most often?
 - a. And how often do you use them? (e.g. constantly, daily, weekly?)
6. What part of the workday takes up the most of your time?
7. What do you think should be included in a dashboard?
8. What do you do versus what official policy says you should do?
 - a. Looking for discrepancies here to see if workflow matches what should be done.
9. What learning resources/styles do you find most helpful for learning how to use and navigate dashboards?
10. How would you measure workload or department progress to see if work goals/commitments are being met?
 - a. Alternatively: How do you define success or accomplishment at work. The number of permits completed per month? Time in the queue? Amount of revenue gained?

Executive/Leadership

1. What do you think of how the dashboards have been used?
2. What information do you use most often?
 - a. And how often do you use them? (e.g. constantly, daily, weekly?)
3. What do you think should be included in a dashboard?
4. Is there reluctance to new tools/processes from staff, and if so what do you think is the cause?
5. What learning resources/styles do you find most helpful for learning how to use and navigate dashboards?

External Stakeholders (i.e. developers)

1. What has been your experience working with Kitsap County's Permit Office?
2. What is the most important information for you to know from the permitting office?
 - a. Place in the queue or stage of the review process?
 - b. How often do you need that information? (daily, weekly, etc)
3. Have you encountered the existing dashboards?
 - a. Any frustrations/challenges?
 - b. What would you like to see change?
 - c. What are your top 3 needs/wants out of these dashboards
4. Do you think it's easy to find the information you need on KCDCD's website? (Do they know about the dashboard?)
5. How do you view/see the status of your permit(s)? Mobile phone, tablet, desktop, laptop, etc.?
6. What questions would you ask other stakeholders?

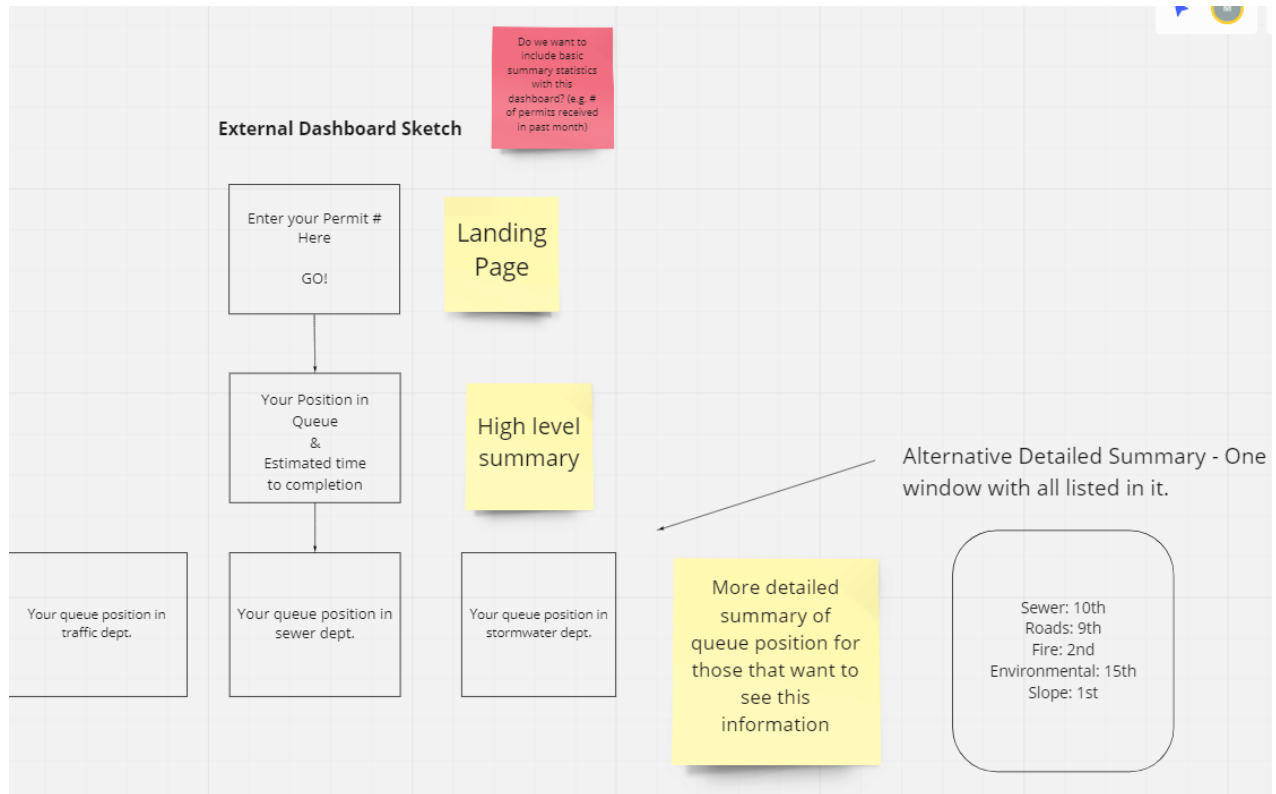
5-County Partners

1. Intro of yourself
2. Permits types and volume you are working with
 - a. How do you manage the workload?
 - b. Which data do you use the most? Which reports are you generating most commonly?
3. What kinds of measures do you track related to permitting?
4. What methods do you use for displaying/sharing this information?
 - a. Do you have a one-stop-shop dashboard/platform for everyone to work with? Any examples
5. What is your organization's comfort level around dashboards/data visuals?
6. What is your organization's experience in getting staff to use new technology or understand metrics?
7. How do you balance transparency with internal employee privacy?
 - a. Is the information shared to reduce the public bothering staff for example?

Appendix 3: Interview Word Clouds



Appendix 4: Dashboard Design Logic using Miro Whiteboard



The Dashboards Arriving Page

External dashboard

Individual

- Type in Permit Number
- See if it has been reviewed
 - Be able to see comments live?

Overall

- How many permits have been reviewed this week?
- How many permits does each "dept." have in its queue?
- Where is your permit at in each departments queue?

Internal staff (only visible to KC)

One overarching visualization/list that would show red/yellow/green priority permits that can then be filtered by department and by individual.

- this would allow KCDCD to work off of "one" pull/data source and see how the whole agency is doing
- would allow each department to better visualize what the team needs to get done: red/yellow/green
- would allow each individual to see what they need to get done red/yellow/green

For Each Individual

- Being able to see all of the permits assigned to them
 - where each one is at in the review process
 - what do *they* need to do for each one
- Daily workloads
 - Color indicators for priority

For Department

- overview, general workload of dept.

Leadership: reporting & data (only visible to KC)

-Overall metrics by department and for entire agency to see how what the trend lines are.

- average review times for DSE vs Building (eg)
- Weekly
- Monthly
- Quarterly
- Annually

Appendix 5: Early Drafts of Dashboards

External Dashboard

Permits Under Review

Search for your permit number

21-02280



HANSON - Detached Garage

Your permit is number 492 out of 494 permits in review.

Overview Information

UNDER REVIEW

Permit Status

4

Days In Review

ZONING REVIEW - RES

Last Assigned To

Wednesday, April 21, 2021

Date Submitted

4

Average Estimated Days to Issue

KPI Dashboard

KPI Dashboard*

*Data as of 6/11/21

530

Overall Permits in Review

1137

Permits Issued Year-to-Date

122

Permits Issued Month-to-date

361

Building Permits in Review

992

Building Permits Issued Year-to-Date

108

Building Permits Issued Month-to-date

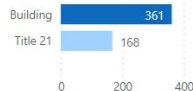
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Title 21 Permits Issued Month-to-date

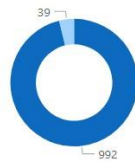
168

Title 21 Permits in Review

Building Permits & Title 21 Permits In Review



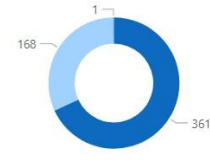
Permits Issued Year-To-Date



Permits Issued Month-To-Date



Building Permits & Title 21 Permits In Review



Permit Type

● Building

● Title 21

● (Blank)