



TRANE



TRANE BUILDING
ADVANTAGE

Case Study: Trane Products

Managing the complexity and development of energy management and performance software,
using progressive methodology, tools, and a Lean UX process

Engineering diagrams > PowerPoint > Miro user flows and online collaboration
> Lean 360 Matrix validation > User Research > Rapid Prototypes > Agile Sprints

The Process



1

New digital products and services review and project kick off.



2

UX Workshop: User Flow Study with SMEs, using Miro online to include remote participation.



3

Assumption requirements are logged and validated with the Lean 360 Matrix, informing UX research and design.



4

With UX research and design completed, Agile Sprints bring UX and Developers together in daily stand-up meetings



5

After Developers produce software, UX validates its usability before Beta versions are deployed.

6



Pre-established success metrics measure data and typically track the KPIs and OKRs.



1



New digital products and services review and project kick off.



Engineering Research, Review & Presentation

Taking the technical information presented by a Trane Engineer and translating that information into a more cohesive user flow, the UX Lead guided a team that included a Product Owner, Systems Architect, UX Manager, Scrum Master and a UX Designer - all participating in an exercise that helped to define, discuss, and document user flows. With that preliminary work in hand, the team decided that they would work in a lean UX fashion, eliminating the need for a B.A. and an extensive requirements documentation and review process.

User Flow for Smart MAINTENANCE (vs. Smart START) Building Owner/Mgr.

1. Building Owner/Mgr. – receives notification that there is a Trane Smart Maintenance Event pending their attention.
 - Depending on how they set up their Smart Maintenance PROFILE, they should do one of the following:
 - A. Do Nothing (?) – everything is pre-approved and it all happens w/out any BO interaction. (i.e: Customer Type = “Set it & Forget it” - just send me the report at the end of the month/quarter....”)
 - B. Acknowledge – YES or YES, but wait until this date.....
 - C. Acknowledge – DEFER
 - D. Approve/Defer
 - E. Approve & Purchase something

NOTE: May also provide a “Remind me Later” function.... Or maybe this is part of the PROFILE.
2. BO (all, except “set it & forget it”) – gets Progress Notice upon Smart Maint Mgmt Milestone reached.
 - Milestones/Progress = Received, In-Progress, Scheduled, On-Site, Completed.
 - Also need to have an Alert that Servicer can instigate to get BO’s attention on something.
 - Also, BO needs to have the ability to communicate directly with Servicer
3. BO – (if Deferred from #1), gets Reminder and Impact statement and ability to Acknowledge/Approve/Defer until next Smart Maintenance Recommendation occurs.
4. BO – gets Smart Maintenance “Value Update”- Monthly
 1. BO can see how the LCC of unit is tracking against baseline and expected performance.
 2. BO – can look at anytime and see History of all Smart Maintenance Recommendations and Completion/Deferral



2

UX Workshop:
User Flow Study
with SMEs, using Miro
online to include
remote participation.

UX Workshop

Using the examples of a Smart Maintenance Event technical diagram in a PowerPoint presentation, this whiteboarding session began as an exercise to identify the User, their goals, the steps required to achieve those goals, and the integrated systems required to support the successful work necessary to achieve those goals.

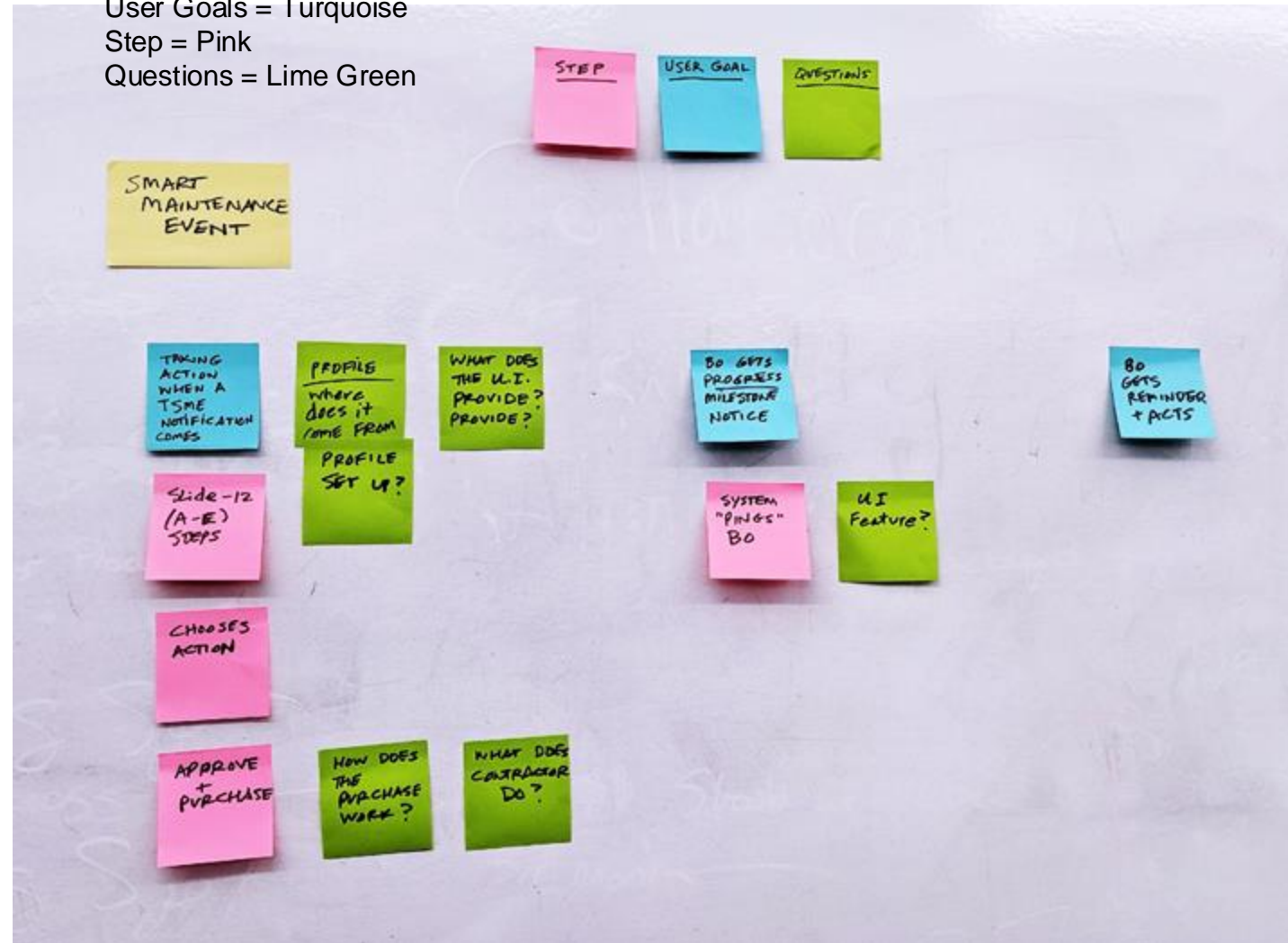
In this scenario design, a Building Manager is the primary Persona.

LEGEND

User Goals = Turquoise

Step = Pink

Questions = Lime Green





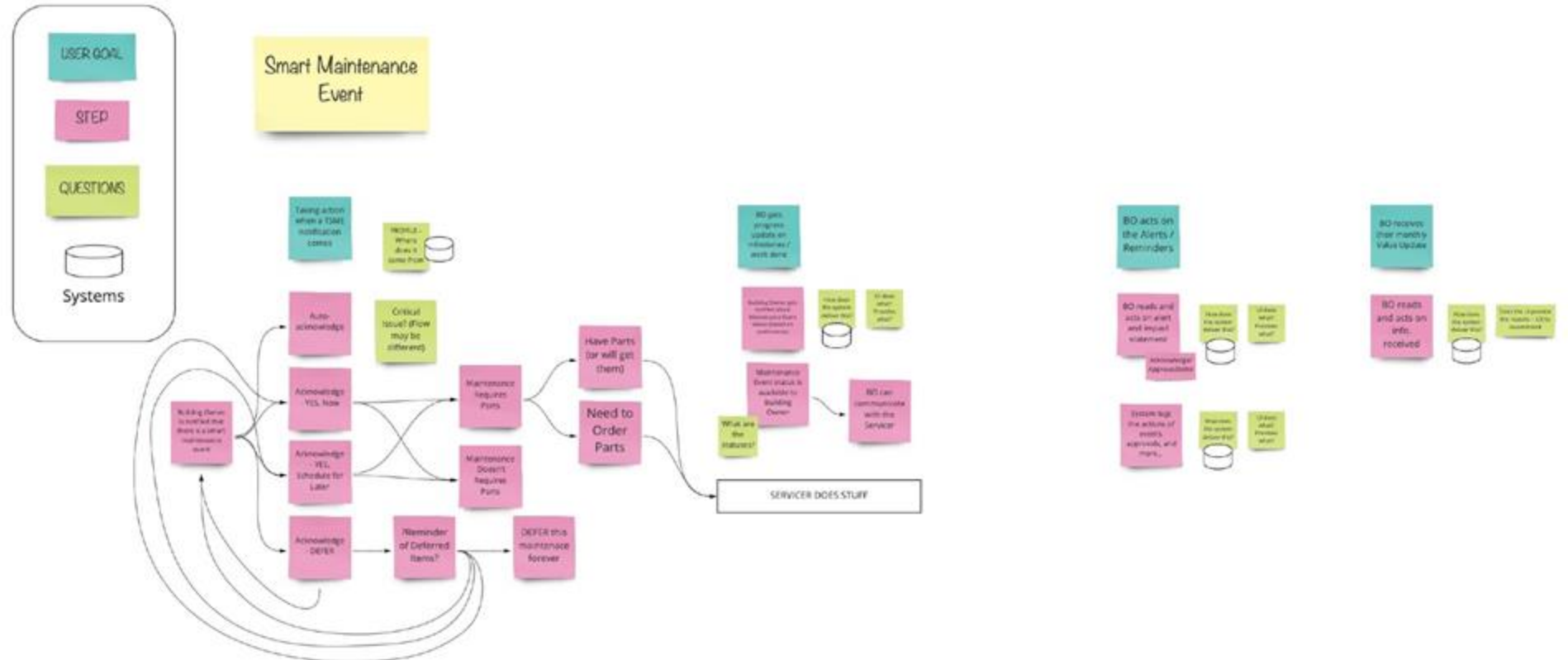
2

UX Workshop:
User Flow Study
with SMEs, using
Miro online to
include remote
participation.

UX Workshops (Cont'd)

User Flow – Online Collaboration using Miro

Translating traditional whiteboard methods into collaborative online methodology, enables any team to work in ways that accommodate teams meeting in person and remotely – opening up the work to any global participant or group. This also provides a way for leadership and stakeholders to observe or participate in any critical steps of a project.



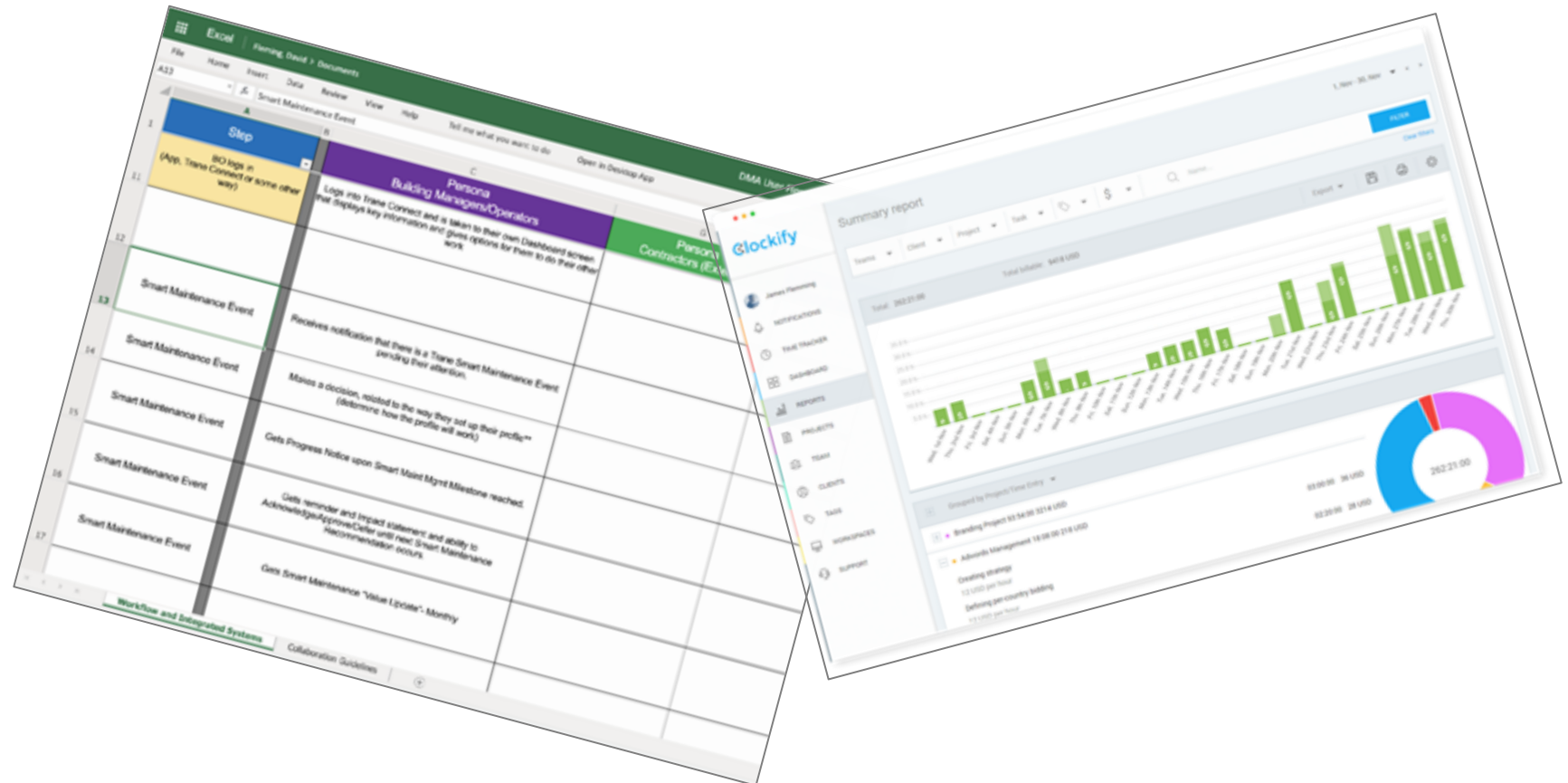
Lean 360 Matrix – Assumption Requirements & UX Research

Linear documentation of the workshop sessions are tracked in the Lean 360 Matrix spreadsheet. This extensible documentation is used to capture and track the User Flow, Integrated Systems, Features projection, KPIs, Questions, Knowledge Gaps and other dimensions typically tracked in traditional requirements. The matrix also covers information that may be gathered using Customer Journey Maps and Service Design Blueprints. This becomes the foundation of UX Research, informed by the gaps and collective knowledge.



3

Assumption requirements are logged and validated with the Lean 360 Matrix, informing UX research and design.



Agile Sprints transitioning

When the team has collaborated and confirmed that the designs align with the software roadmap, it's time to translate and transition into JIRA sprints—the term given to define the timing of work streams in development . Epics and Stories are used by the teams to assess, point, and develop. Led by Product Owners, UX will manage the work, along with Scrum Masters, QA, and other SMEs.



4

With UX research and design completed, Agile Sprints bring UX and Developers together in daily stand-up meetings

A composite image showing two overlapping screenshots. The top screenshot is a JIRA interface for a project named 'Trane Digital Support' with a 'TDS Kanban Board'. It displays a 'Backlog' view with a search bar, user avatars, and a list of issues under the 'Needs Review' section. The bottom screenshot is a Miro board titled 'Grid Services PI-20.4'. It features a grid layout with various sticky notes and diagrams. Key sections include 'GOAL', 'WHY', 'Market Expansion & Scalability', 'Usability and Performance', 'Customer Views & Cross-product needs', 'Production Support', and 'UX'. The board is populated with numerous purple and yellow sticky notes, some with dates and icons, representing a detailed project plan or workflow.

Developers validating with UX and then deploying

Deployment goes through the prestaging and design validation phases until the latest solution is released.



5

After Developers produce software, UX validates its usability before Beta versions are deployed.



Program Details > Term Details

20 for Demo Program Current Time: 09:48 Central (CDT)

Demand Response Marketplace: CAISO Transmission: Central (EST/CDT)

Event Time Windows	Target Demand Reduction	Program Min. Notification Time	Location Min. Notification Time	Min. Duration
N/A	1200 kW	3 hrs	1 hrs	2 hrs 2 mins
Max. # of Events				
22				

[+ ADD LOCATION](#) [+ CREATE NEW EVENT](#)

START DATE	START TIME	EVENT TYPE	DURATION	DEMAND REDUCTION	EVENT STATUS
Apr 28, 2019	1:27 (CDT)	REAL EVENT	0hrs 27mins	Target: 1427kW	Created
Apr 29, 2019	1:00 (CDT)	REAL EVENT	1hrs 0mins	Target: 200kW	Completed
Apr 29, 2019	5:01 (CDT)	REAL EVENT	2hrs 0mins	Target: 1000kW	Created
Apr 29, 2019	9:52 (CDT)	REAL EVENT	2hrs 0mins	Target: 1200kW	Created
May 06, 2019	14:14 (CDT)	REAL EVENT	2hrs 0mins	Target: 1200kW	Created
May 16, 2019	14:40 (CDT)	REAL EVENT	0hrs 5mins	Target: 1200kW	Created
Jun 11, 2019	11:21 (CDT)	REAL EVENT	2hrs 0mins	Target: 1200kW	Created
Jun 11, 2019	11:23 (CDT)	REAL EVENT	2hrs 0mins	Target: 1200kW	Completed
Jun 11, 2019	11:27 (CDT)	REAL EVENT	2hrs 0mins	Target: 1200kW	Completed
Jun 25, 2019	1:00 (CDT)	REAL EVENT	2hrs 0mins	Target: 200kW	Created
Jun 24, 2019	17:00 (CDT)	TEST EVENT (AWAKE/ON-ACE)	2hrs 2mins	Target: 1201kW	Created
Jun 15, 2019	12:30 (CDT)	TEST EVENT (TRAND)	2hrs 0mins	Target: 1201kW	Completed
Jun 24, 2019	12:40 (CDT)	REAL EVENT	0hrs 1mins	Target: 0kW	Completed
Jun 30, 2019	14:50 (CDT)	REAL EVENT	2hrs 0mins	Target: 1201kW	Completed

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6



Pre-established success metrics measure data and typically track the KPIs and OKRs.




With KPIs and/or OKRs in place, success metrics are defined early and measured upon release.

Depending upon the organization, different approaches are used to define and measure success. UX can augment this work with Usability Testing, Surveys and Analytics programs such as Amplitude or Google Analytics.

Additional UX Research examples and UI Prototypes for Energy Performance Management

Gridflex - Demand Response and Day Ahead Offerings
Digital Maintenance Solutions – Remote Monitoring
Personas - Customer Service Solutions
Surveys – Internal Trane Information Flow
Zendesk Integration – Contemporary support solutions

Bulk Events

Jane Doe | Help | English

GridFlex™ > Programs > Program Details > Bulk Event

Create Bulk Demand Response Event

SAVE AND SUBMIT TO CONTROLLER SAVE CANCEL

Cole's NYISO program Program Type: Demand ResponseMarketplace: NYISOTimezone: Eastern (EST/EDT)

Set Event Details:

Real Event Test - Marketplace Test - Trane

Start Date: [calendar icon] Start Time (EST): [clock icon] Duration: 00 hrs 00 mins Target Demand Reduction: 1400 kW Total Available Demand Reduction: 5901 kW

Select Building(s):

TESS NYISO - 1 TOTAL TARGET DEMAND RESPONSE KW


<input checked="" type="checkbox"/>	BUILDING	TARGET DEMAND RESPONSE	TOTAL AVAILABLE DEMAND RESPONSE
<input checked="" type="checkbox"/>	HUDSON VALLEY B-5	150 KW	150 KW
<input checked="" type="checkbox"/>	NYC Power Facility 8	200 KW	200 KW
<input checked="" type="checkbox"/>	HUDSON VALLEY B-6	100 KW	100 KW
<input checked="" type="checkbox"/>	NYC Power Facility 7	250 KW	250 KW

TESS NYISO - 2 TOTAL TARGET DEMAND RESPONSE KW

<input type="checkbox"/>	BUILDING	TARGET DEMAND RESPONSE	TOTAL AVAILABLE DEMAND RESPONSE
<input type="checkbox"/>	HUDSON VALLEY B-5	150 KW	150 KW
<input checked="" type="checkbox"/>	NYC Power Facility 8	200 KW	200 KW
<input type="checkbox"/>	HUDSON VALLEY B-6	100 KW	100 KW
<input checked="" type="checkbox"/>	NYC Power Facility 7	250 KW	250 KW

11

Program Details

Jane Doe | Help | English

[GridFlex™](#) > [Programs](#) > [Program Details](#)

Cole 5/6/2019

Program Type: Demand Response **Marketplace:** El Paso Electric **Timezone:** Central (CST/CDT)

Description: None

Terms Hide Inactive SEND BULK EVENT CREATE NEW TERM

START DATE	END DATE	TARGET DEMAND REDUCTION	PROGRAM MIN NOTIFICATION TIME	BUILDING MIN NOTIFICATION TIME	MAX DURATION	MAX. HRS. LOAD REDUCTION	MAX # OF EVENTS	
02/19/2020	04/30/2020	100 kW	n/a	3 hrs 3 mins	6 hrs 0 mins	n/a	n/a	VIEW DETAILS

Bulk Events

^ **TESS NYISO - 1** TOTAL TARGET DEMAND RESPONSE KW [VIEW DETAILS](#)

<input checked="" type="checkbox"/>	BUILDING	TARGET DEMAND RESPONSE	TOTAL AVAILABLE DEMAND RESPONSE
<input checked="" type="checkbox"/>	HUDSON VALLEY B-5	150 KW	150 KW
<input checked="" type="checkbox"/>	NYC Power Facility 8	200 KW	200 KW
<input checked="" type="checkbox"/>	HUDSON VALLEY B-6	100 KW	100 KW
<input checked="" type="checkbox"/>	NYC Power Facility 7	250 KW	250 KW

v **TESS NYISO - 1** TOTAL TARGET DEMAND RESPONSE KW [VIEW DETAILS](#)

GridFlex UI

Day Ahead
Locations

The screenshot displays the TRANE GridFlex UI for the CAISO PDR program. The header includes the TRANE logo, user information (tranetitest gridedit), and language settings (English). The breadcrumb trail shows the path: GridFlex™ > Programs > CAISO PDR.

CAISO PDR

Program Type: **Day Ahead** | Marketplace: **CAISO** | Timezone: **Pacific (PST/PDT)** | Marketplace Close Time: **8:00 (PDT)** | Marketplace Clear Time: **10:30 (PDT)**

Description: **test description**

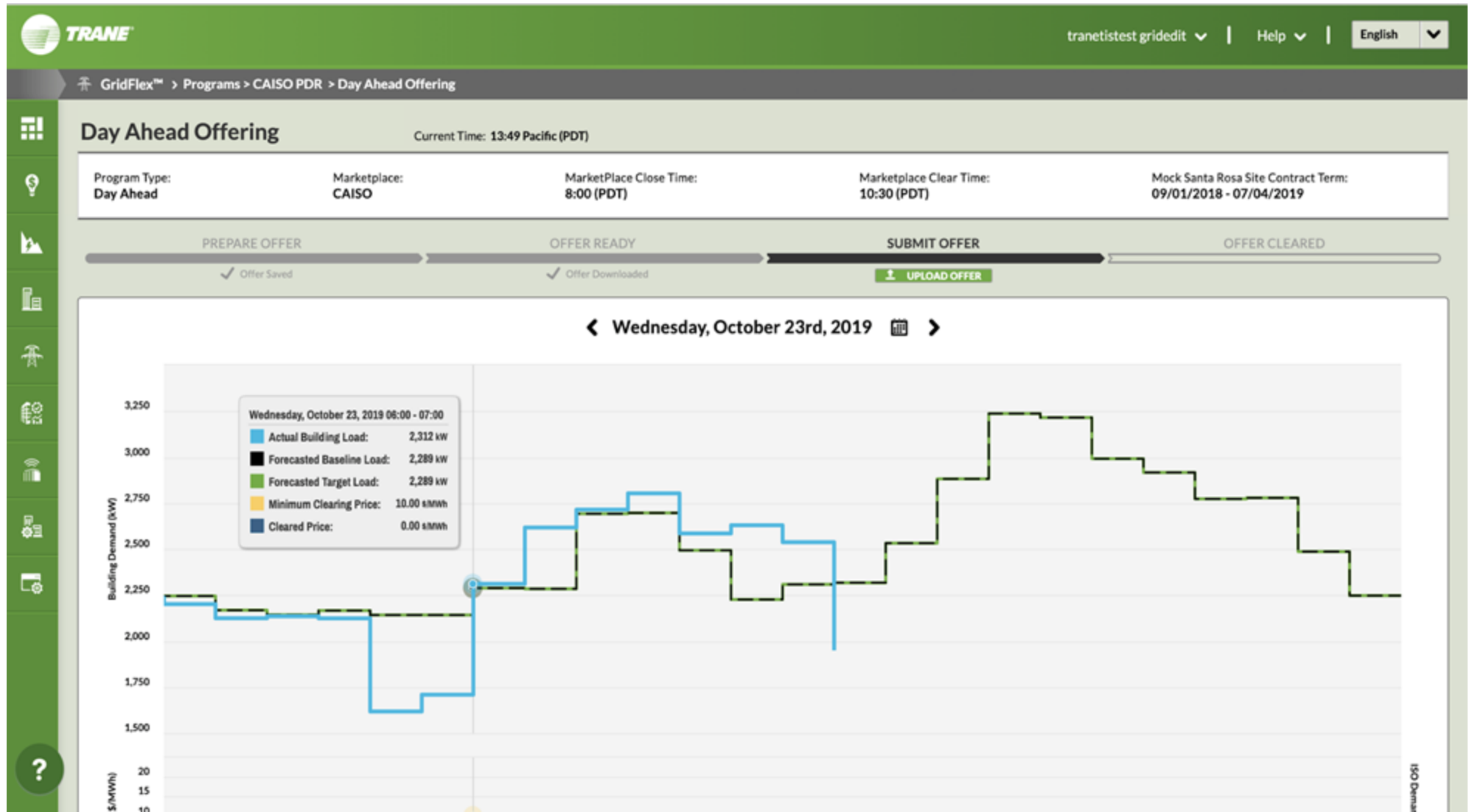
Locations + ADD LOCATION

LOCATION NAME	CONTRACT START DATE	CONTRACT END DATE	TOMORROW'S EVENT STATUS
AMC 139 - CANTERA 30	06/12/2019	10/12/2019	Market Review UPLOAD OFFER VIEW DETAILS
AMC Grapevine Mills 30 - 0175	04/29/2019	04/29/2019	Market Review UPLOAD OFFER VIEW DETAILS
Mock Santa Rosa Site	09/01/2018	07/04/2019	Market Review UPLOAD OFFER VIEW DETAILS
Riverside Elementary	09/01/2019	09/30/2019	Market Review UPLOAD OFFER VIEW DETAILS
Santa Rosa Waste Water Treatment	04/15/2019	07/20/2019	Market Review UPLOAD OFFER VIEW DETAILS
Trane El Paso CSO Office	04/17/2019	06/12/2019	Market Review UPLOAD OFFER VIEW DETAILS

Trane Connect [branch: master] [pipeline: #121960] [commit: cc61c7bc]
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GridFlex UI

Day Ahead Offering & Chart



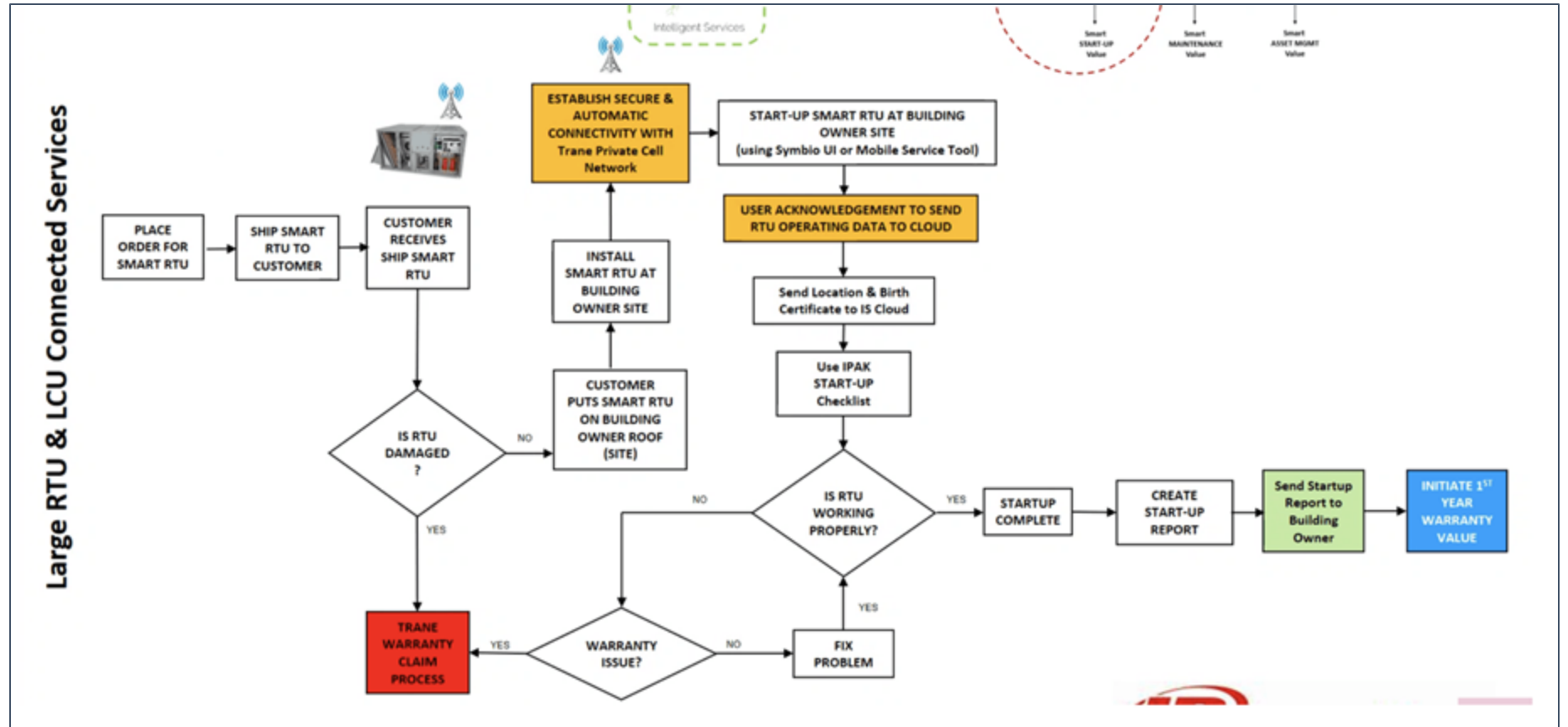
GridFlex UI
Demand
Response -
Create Term

The screenshot shows the 'Create Term' interface in the GridFlex UI. The header includes the TRANE logo, user 'tranetest gridedit', and language 'English'. The breadcrumb trail is 'GridFlex™ > Programs > El Paso Electric > Create Term'. The form is titled 'Create Term' and has 'CREATE' and 'CANCEL' buttons. It contains the following fields:

- Program Name: El Paso Electric
- Program Type: Demand Response
- Marketplace: ERCOT
- Set Term Detail section:
 - Start Date*: 10/23/2019
 - End Date*: 10/23/2019
 - Set Time*: 00:00 - 00:00
 - Target Demand Reduction*: [input] kW
 - Program Min. Notification Time: [input]
 - Location Min. Notification Time: [input]
 - Max. Duration: [input]
 - Max. Hrs. Load Reduction: [input]
 - Max. # of Events: [input]

Footer text: Trane Connect [branch: master] [pipeline: #121960] [commit: c683c7bc] ©2019 Trane | Privacy Policy | Terms of Use. Ingersoll Rand logo is also present.

Engineering
Diagrams to be
translated into
User Flows



Digital Maintenance Solutions: *Startup* > *UX Baseline Assumptions*

Baseline Startup Assumptions and Discovery Questions

The Building Owner purchases an RTU. The next steps here will include the best UX for supporting the set up of the account for the customer. What is the ideal protocol?

1



QUESTIONS

How can we better understand how this will flow the best? We could do a Mental Model - Task List > session where we break down what the best user experience would look like and then work through what we can actually provide for them overall. The best outcome of that will be coming up with the ideal workflow and work forward from there.

1. BO purchases the RTU and the person who sells them the deal, assists them in setting up their account.
2. After the purchase, the BO is guided through the account set up where they, or their staff, fill out the necessary details.
3. Trane will also set up a personal space where the BO can see their information and interact with the key team members involved. This UI would take the form of a web page or mobile equivalent or possibly an App.

Part of the account set up would include a step where the customer (or office staff) are given a link to set up their account in CRM.

2



TISC Operations and Teams

QUESTIONS

How can we make that step as easy as possible for the customers?
What is it like today?
Who are the Trane leaders who will know more about that?
- Start with Sandy, Jeff H, Phil H, and Ian Moore

1. Once the account is set up by the BO, they will have a way to access and review.
 - a) All account details
 - b) Attach docs to their account
 - c) Review notes about the history of the services and equipment's operational status
 - d) Access all relevant contact information, such as Contractor name, phone and email, and Trane Support communication, Trane SMEs, Trane Acct Manager, Trane Parts contacts, etc.

In this startup step we can map out the best workflow steps along with the ideal integrated system steps, supporting the ideal UX.

3



RTU accounts

QUESTIONS

Will the start up contractor validate that the RTU is operating as expected, and then send a note and/or signal to the BO that the RTU is operational and ready to access on the (Trane?) BO UI?

Can we utilize the Provider Group CRM setup and access the TISC Ops can provide?

1. The Contractor starts up the RTU, looks at his mobile UI/App and sees that the RTU is operating well.
2. The Contractor uses the UI to confirm that the RTU is operating as expected. This confirmation can be an automated message that goes to Trane and to the BO.
3. The BO receives the message in email, letting them know that the RTU is operational and that it's okay to login to the system.

Using our basic Trane Connect login experience, we can start here and bring the BOs and the Contractors into their respective page and dashboard views.

4



Building Manager & Contractor UI

QUESTIONS

Can both the BO and Contractors use the TC pages and mobile views?

1. The BO logs into their RTU UI (first assumption: Trane Connect) and is then able to do the following actions:
 - a) Review their account information
 - b) Assess the status of their RTU components
 - c) Communicate with the Contractor(s) - details are in their acct. information.
 - d) Communicate with Trane - details are in their account info.
 - e) Upgrade their warranty, using a link in their warranty PDF.
2. Assumption: that the Contractors will have their own TC space created, allowing them to also be able to monitor the RTU status and send communication to the BO.

Proto-Personas and Standard Personas

RTU -IPAK Contractors - Installer/Service, non-Trane



Ronnie RTU

Demographics

32, Family man with two kids, ages 7 and 9
Blue collar culture, lives in North Carolina
Worked on and off with Trane for 7 years
Has a strong relationship with a Trane Acct Manager

Work Goals

- Installation of RTU/IPAK
- RTU Servicing

Behavioral

- Prefers Mobile device: uses his Smartphone

[Try to focus on demographic information that predicts a specific type of behavior. For example, there may be cases in which the persona's age is totally irrelevant yet their access to a specific device, such as an iPhone, will completely change the way they interact with your product.]

Needs

- User friendly App
- Alerts
- Wireless connectivity
- Fast & Easy access to Support

Pain Points / Frustrations

- Smooth Communication with all team members
- Wireless connectivity

[The bottom-left quadrant contains the user's needs and frustration with the current product or situation, the specific pain points your product is trying to solve, and/or the opportunity you're trying to address.]

Solutions

- Mobile UI
- Easy to use software
- Option to log in from a link, vs. signing up for an account (?)

[The bottom-right quadrant contains potential solutions for those needs. You'll use the bottom-right quadrant to capture feature and solution ideas.]

Qualtrics User Surveys



This brief survey is being conducted to understand the usage of the Service Fulfillment –DOT site on the HUB.
Thank you for taking the survey!



Q5.
What is the PRIMARY reason that you would use the Service Fulfillment – DOT site on the HUB?

- Accessing training material
- Answering questions about standard work or processes
- Sharing information with others on your team
- Training new personnel
- Other

Q6.
How often do you refer specifically to the Service Fulfillment – DOT site on the HUB?

- Frequently (Daily)
- Often (Weekly)
- Occasionally (Monthly, or less often)

Zendesk Integration

The screenshot displays the Trane GridFlex Programs interface. At the top, the Trane logo is on the left, and the user 'tranetistest gridedit' is on the right. Below the logo, the breadcrumb 'GridFlex™ > Programs' is visible. The main content area is titled 'Programs' and includes a 'Marketplace' dropdown menu set to 'All'. A table lists various programs with columns for Program Name, Marketplace, Program Type, Event Status, and Actions. A help menu is open, showing options like 'Chat', 'Help Support Agents', and 'Feedback Form', with a 'zendesk' link highlighted in the Actions column.

PROGRAM NAME ▲	MARKETPLACE	PROGRAM TYPE	EVENT STA	ACTIONS
10/11 POSTGRES DR	ERCOT	Demand Response	N/A	N/A
A NEW PROGRAM	CAISO	Demand Response	N/A	N/A
AUTOMATION DA PROGRAM 101419103324	ERCOT	Day Ahead	N/A	N/A
AUTOMATION DR PROGRAM 101419102850	MISO	Demand Response	N/A	N/A
CAISO PDR	CAISO	Day Ahead	N/A	N/A
COLE 5/6/2019	El Paso Electric	Demand Response	N/A	N/A
DEMO PROGRAM	ERCOT	Demand Response	N/A	N/A
FIRST DEMAND RESPONSE PROGRAM	CAISO	Demand Response	N/A	N/A
POSTGRES TAKE 2 DA	CAISO	Day Ahead	N/A	N/A
SECOND PROGRAM	CAISO	Day Ahead	N/A	N/A
TEMP	CAISO	Demand Response	N/A	N/A
TEST	CAISO	Day Ahead	N/A	N/A
TEST 2	Another test	Day Ahead	N/A	N/A
TEST 3	Another test again	Day Ahead	N/A	N/A
TEST 30	Another test again	Day Ahead	N/A	N/A
TEST DA	CAISO	Day Ahead	N/A	N/A
UX WALK THROUGH	CAISO	Day Ahead	N/A	N/A
UX WALK THROUGH V2	CAISO	Demand Response	N/A	N/A
ZZ DA UPDATED PROGRAM 042319144745 UPDATED	El Paso Electric	Day Ahead	N/A	N/A
ZZ DR EDITED PROGRAM 041919215844	ERCOT	Demand Response	N/A	N/A



TRANE



TRANE BUILDING
ADVANTAGE

Q & A

Dave Fleming | UX Architect



Thank you!