Product Roadmaps

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Product Management

- A key element is customer involvement to ensure the solution will be of value to an organization and solves a business need

- Engaging and soliciting customer feedback is critical in the success of developing our solutions

Product Management

2015 User Conference: Hosted by UPS, Louisville

Key product development items:
- Interactive Graphical Editor – delivered in Q1 2016,
- Integrated Reporting Module – delivered in Q3 2016,
- Improve System Performance (accelerating processing time) – delivered in Q3 2016

Product Management

2016 User Conference: Hosted by Delta Air Lines, Atlanta

Key product development items:
- Offer a web-based solution – 1st generation delivered in Q2 2017,
- System performance to lower processing time for large data sets – Q3 2017,
- Airport Workload Interface – delivered in Q3 2017

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2017 User Conference: Hosted by JetBlue, New York

Key product development items:

- Provide a "Day-of" Solution – delivered Q3 2017, the Command Line Interface is now available
- Develop an online Training Portal – solution review at 2018 Conference, planned to be release in Q1 2019
- More data analytics and peripheral modules for Fatigue Reporting and Crew Survey – market research and initial design solution review at 2018 Conference

Product Management

2018 User Conference: Hosted by American Airlines, Dallas

Key product development items:

- Identified a need to maintain the Windows-based solution
- Continue to develop a web-platform that can be deployed as a standalone solution with SFC feature set
- Continue to develop the Web/Command Line solutions for Crew Scheduling/Day-Of deployment
- Continue to develop a wearable solution for data collection

SFC

SafteFAST
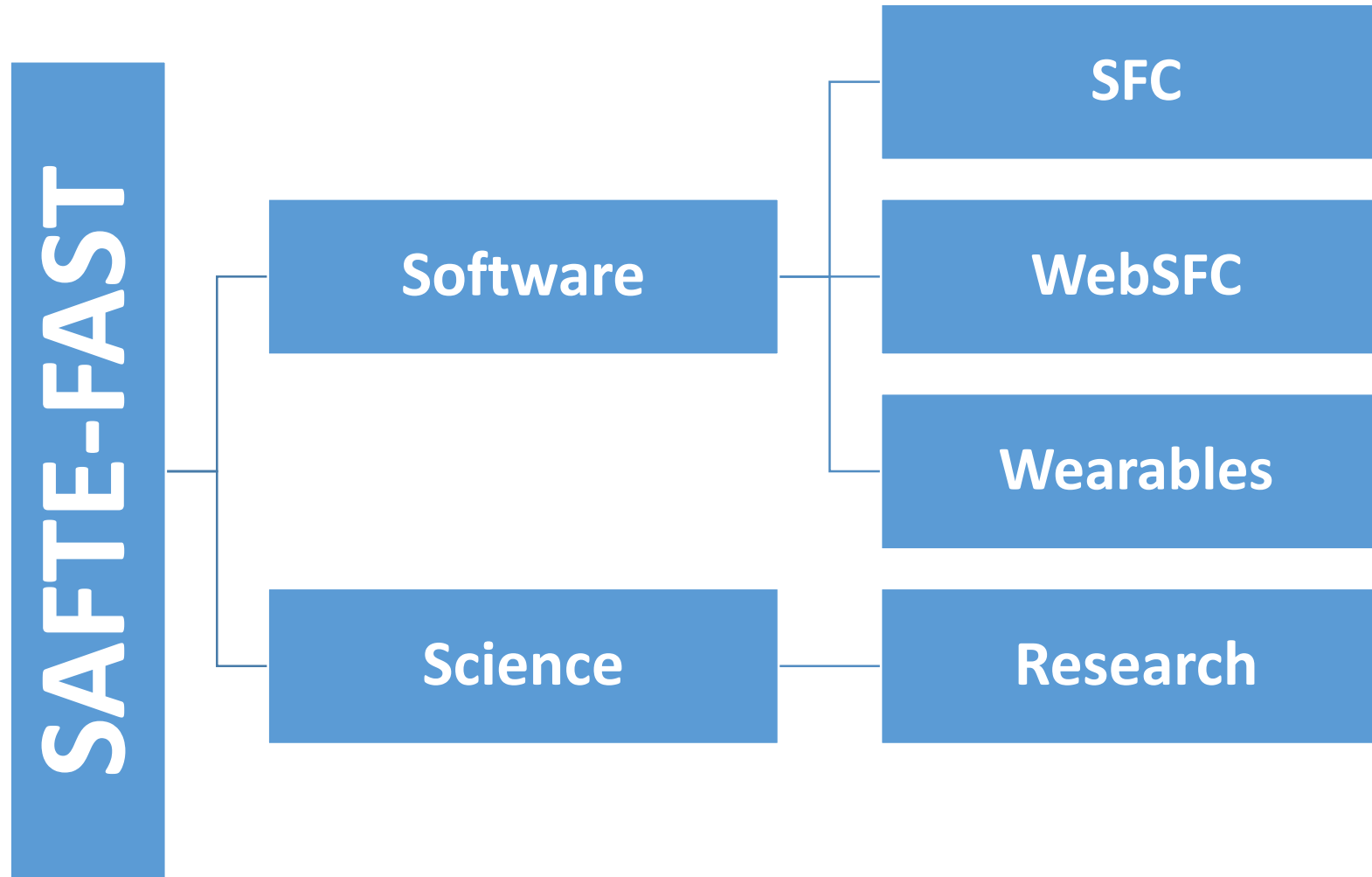
- New development done with common architecture and technology to allow for deployment in both the SFC and WebSFC

2019 Roadmap Completed

- **Features**
  - Scenarios
  - File Importing
  - Sharing

- **Training Portal**
  - General Aviation, Military customers

- **New Web Platform**
  - Transition existing web customers off legacy solution

2020

- **Enhanced Workload**
  - Configurable airport attributes
  - Airport attribute weighting
  - Configurable look-back period
- **Shift Work Editor**
  - Interface to create shifts and shift patterns
  - Model a configurable amount of time days or week
- **Enhanced Reporting**
  - Highly customizable reports
  - Intuitive interface

2021

- **Fatigue Risk Intelligence (FRI)**
  - Algorithm that identifies trends in data and predictive reports
  - Includes a pairing and roster risk report to add rule to optimizers

- **Sleep Algorithm Improvements**
  - Sleep Quality Studies at high altitudes
  - Sleep across multiple timezones and re-acclimation at base

WebSFC

SAFTEFAST

- IBR will continue the development of the WebSFC to the point where it is on the same feature parity as the current SFC

- Any new feature development will be added to both the SFC and WebSFC

Phase 1
Completed

- **Features**
  - Schedules List
  - Schedule Editor
  - Administrator Page

- **Objective(s)**
  - General Aviation, Military customers

Phase 2
Completed

- **Features**
  - Scenarios
  - File Importing
  - Sharing

- **Objective(s)**
  - General Aviation, Military customers
  - Allow a customizable Crew Scheduling/ Day-Of solution

Phase 3

- **Features**
  - Parameter / Templates Editor
  - Events Table
  - Additional Metrics
  - Output Files
  - Stations Table
  - Reporting Module

- **Objective(s)**
  - Transition other Industry users
  - Transition smaller sized airlines

Phase 4

- **Features**
  - Complete SFC Feature Parity

- **Objective(s)**
  - Transition customers to new solution
  - Database will allow greater reporting possibilities for trend analysis and fatigue profiling

Wearables

SAFTEFAST

- Solutions for organizations for data collection, de-identified and does not require a User to submit data to a cloud

- Solutions for individuals to monitor sleep health

2018 Roadmap

- **Zulu**
  - Low cost data collection option
  - Data is maintained on the devise and extracted by Manager using iOS App
  - Sleep data can be imported into the SFC using actual sleep
  - Sleep data and efficiencies exported as a CSV file

2019 Roadmap

- **Sleep Hygiene Devices**
  - Fitbit Versa
  - Apple Watch

2020 Roadmap

- **Data Collection Device**
  - AMI Zzz Logger

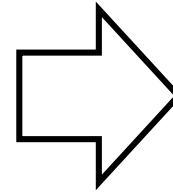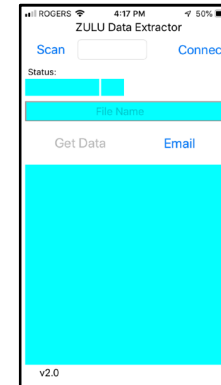# Wearables: Data Collection Devices (Zulu)

Employees

Zulu
- ✓ Distribute Zulu prior to work event to capture sleep at home
- ✓ Wear Zulu for the duration of the work event
- ✓ Wear Zulu when back at base
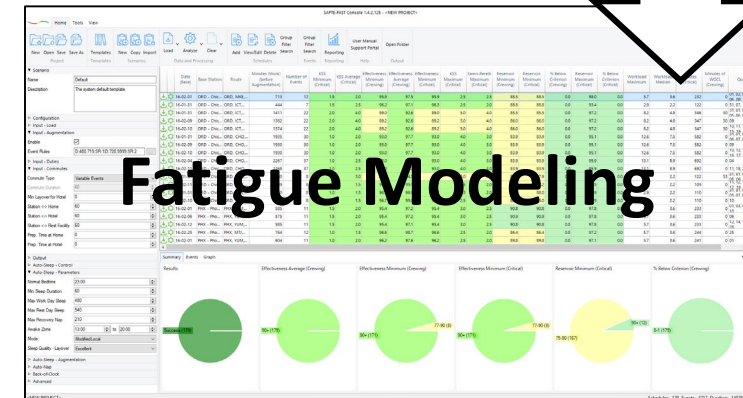- ✓ Submit Zulu to Manager

Managers

ZULU Data Extractor

Scan   Connect

Status:

File Name

Get Data   Email

v2.0

Data Extraction Application
- ✓ De-Identified data
- ✓ Sleep Event Date
- ✓ Sleep Event Start
- ✓ Sleep Event End
- ✓ Sleep Duration
- ✓ Sleep Efficiency

Fatigue Modeling

Wearables: Sleep Hygiene Devices

- Intended to positively change personal sleep behavior

- Designed to raise awareness of the consequences of insufficient sleep

Science and Research
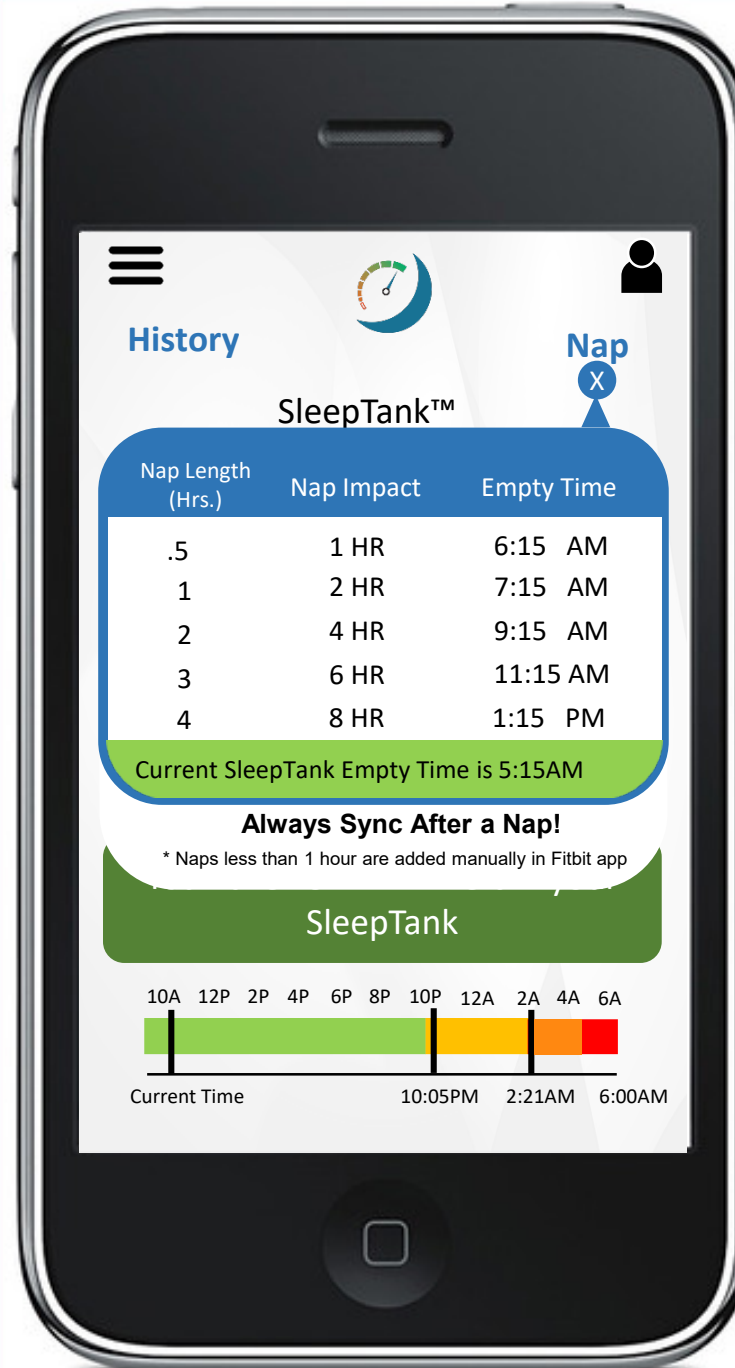
- Continual research in sleep and performance by IBR Science Staff

2019

- **Shiftwork Studies**
  - Sleep and performance studies during shifts for medical staff

2020

- **Fatigue Risk Intelligence (FRI)**
  - AI analytics development to automatically generate a fatigue profile once data has been loaded and analyzed in SF
  - Fatigue profile report in human readable format to write rules to pairing and roster optimizers
- **Workload and Fatigue**
  - Research into the effects of workload on performance and fatigue

Key science study on shiftwork:

- Assess the prevalence of fatigue risk in physician schedules/hospital settings:
  - Document their actual sleep patterns – we tracked sleep from 24 residents using the Zulu
  - Adjusted SFC parameters to best model physician sleep
  - Using SFC – we analyzed schedules from 89 residents at Washington DC area hospitals

Key science study on shiftwork Part 2 of study in progress:

- Making the SleepTank available to study participants to give them feedback on their sleep:
  - Document if providing SleepTank information changes sleep behavior in the study group

Key study components:

- To make this an industry leading feature IBR has partnered with the University of Waterloo:
  - The University of Waterloo is recognized around the world for its excellence in Engineering and Mathematics and applying research to solve industrial needs
  - To design a data-driven decision support system in which data on previous best practices is used to provide a solution to a new problem
  - Incorporate Artificial Intelligence and Data Mining for knowledge generation, to predict the future for better planning, and most importantly to prescribe courses of action

Specific areas that could benefit from this are:

- Feedback on these duties is collected and crossed referenced from all available sources (Pairings, Rosters, Day-Of...), then they could be used to enhance future solutions, examples:
  - Crew pairing/roster with fatigue assessment
  - Fatigue assessments for use in pairing/roster optimization
  - Schedule recovery best practices with forward looking logic
  - Identifying a combination of factors that would contribute to risk
  - Crew Training to prepare for certain duty types or rosters

Key study components:

- Changes in circadian rhythm
- Pairing/Roster attributes that may contribute to fatigue:
  - Short/long connection times
  - Operating during the WOCL
  - Long duty days (with/without high workload)
  - Deadheading/positioning flights (with/without inflight rest)
  - Operating Airport workload
  - Consecutive nights or early starts
  - Switching from an early start to a late start
  - Backward rotations (progressively earlier starts across days)
  - Other factors that may effect performance

Next Steps:

- Compiling data from multiple types of operations:
  - High density short-haul pairings and rostering data
  - Medium-haul crossing 1-3 timezones pairings and rostering data
  - Long-haul crossing multiple timezones, with augmentation and inflight rest facilities information pairings and rostering data

Key study components:

- Research into the effects of high workload or stressful environments
  - Impact on fatigue
  - Impact of performance (reaction time, decision making)
  - How long before the effects dissipate
  - Validation and adding results of study as new logic to SAFTE-FAST workload feature
  - Research partners are currently being solicited

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Fatigue Management Solutions

Questions?

Conclusion of Presentation

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