ReHAP
Rehabilitation and Healthcare Analytics Platform

Checkpoint Presentation
ReHAP MVP Basic Aims

- Web-based tool
- ReHAP “Priority List” on every therapists’ laptop
- Connect to live EMR (EPIC) data
  - Auto refresh every 5 min
- Modes for PT, OT, Manager, Physician
- Instance of application to be deployable on-site
- Simple and seamless to use
Team

Krishnaj Gourab, MD
Director PMR consults. JHH, JHBMC

John Adamovich, MHA
Administrator R&I
JHHCG

Michael Cohen, BS
Sr Software Engineer, TIC

Tony Pan, BS Candidate
JHU

David West, BME Candidate
JHU

Gorkem Sevinc, MSE
Managing Director, TIC

TECHNOLOGY INNOVATION CENTER

JOHNS HOPKINS MEDICINE
Dependencies

- Enterprise Service Bus (ESB) integration
- Cooperation between Web Services
- Secure development environment
  - SSL into Hopkins server
- Knowledge of Rails
- PostgreSQL
- JIRA + Bitbucket (SCRUM)
- Cooperation with JHBMC PT/OT team for shadowing
- HIPAA compliance (intermediate certification)
- D3.js for visualization
- Possibly DataTables.js + DTEditor.js
- Weekly team meetings Tuesdays on Hangout and at FF East
- Cooperation with Tony Pan (dev partner)
Dependencies

- Enterprise Service Bus (ESB) integration
- Cooperation between Web Services
- Secure development environment
  - SSL into Hopkins server
- Knowledge of Rails
- PostgreSQL
- JIRA + Bitbucket (SCRUM)
- Cooperation with JHBMC PT/OT team for shadowing
- HIPAA compliance (intermediate certification)
- D3.js for visualization
- Possibly DataTables.js + DTEditor.js
- Weekly team meetings Tuesdays on Hangout and at FF East
- Cooperation with Tony Pan (dev partner)
Dependencies

• Enterprise Service Bus (ESB) integration
• Cooperation between Web Services
• Secure development environment
  – SSL into Hopkins server
• Knowledge of Rails
• PostgreSQL
• JIRA + Bitbucket (SCRUM)
• Cooperation with JHBMC PT/OT team for shadowing
• HIPAA compliance (intermediate certification)
• D3.js for visualization
• Possibly DataTables.js + DTEditor.js
• Weekly team meetings Tuesdays on Hangout and at FF East
• Cooperation with Tony Pan (dev partner)

MDL = Great solution

Replacing with other intermediate data ingestion
Dependencies

- Enterprise Service Bus (ESB) integration
- Cooperation between Web Services
- Secure development environment
  - SSL into Hopkins server
- Knowledge of Rails
- PostgreSQL
- JIRA + Bitbucket (SCRUM)
- Cooperation with JHBMC PT/OT team for shadowing
- HIPAA compliance (intermediate certification)
- D3.js for visualization
- MATERIAL DESIGN LITE (.io)
- Weekly team meetings Tuesdays on Hangout and at FF East
- Cooperation with Tony Pan (dev partner)
Deliverables

Minimum

• Create and populate database
• Implement Rails app framework
• PT/OT view and permissions
• Shadow-informed front-end mockups for all users
• Prioritization algorithm implemented in Rails app

Expected

• Manager view + permissions
• ESB set up and integrated with Rails app
  - Refreshing every 5 mins
• Single-sign-on server configuration

Maximum

• Physician view + permissions
• Deployed at JHBMC
• Tested by PT/OT teams at JHBMC
• Instances deployed or configured to be deployed at non-JH facilities
Streamlined Workflow

Entry Point  Authentication  Dashboard  Details

Epic Dashboard  Single Sign-on  Therapy Manager  Physician

Patient details  Risk Prediction

Therapist  OT  PT

JOHNS HOPKINS UNIVERSITY OF MEDICINE

TECHNOLOGY INNOVATION CENTER

JOHNS HOPKINS MEDICINE
Epic Entry Point

[Image of a computer screen showing the Epic physician dashboard with various sections such as My Credentials, My Reports, Provider Reports, and IP My Patients - Notes Missing Charges.]
Sign on
Therapy Manager Mockup

ReHAPPY 2.0

Inpatient Therapist Utilization Manager

10/30/2015
4:00 PM
Patients highest priority for PT eval today

Patient Name | Unit
-------------|------
N. Prom      | Med B
K. Tan       | NCCU
M. Mayo      | Sx floor
S. Kat       | NSU
T. Mock      | PCU
L. Zach      | Med A

Order of Highest Priority
less impaired more impaired

Covering therapist
Yesterday/Today
Mat K
Sota P
TBA
TBA
TBA
TBA

Patients needing therapy

SICU  PCU  6W  NCCU  Ortho  BWU

<table>
<thead>
<tr>
<th></th>
<th>6L</th>
<th>6L</th>
<th>4L</th>
<th>1L</th>
<th>3L</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

Caseload per therapist

Kelly D
Current Unit: Med A
Re Tx: 4
New evals: 4

Chris G
Current Unit: Obs
Re Tx: 4
New evals: 4

Ann E
Current Unit: Ortho
Re Tx: 4
New Eval: 4

Tae E
Current Unit: Ortho
Re Tx: 4
New Eval: 4
Patient Level View

Analytics Tool for Functional Trajectory Across Care Continuum: Patient Level View

Activity/mobility trends over time

Smyth A.
DOB: 01/26/5545. MRN: 
HC Nurse Manager: (234) 567-8910

Date Range for activity & mobility tracking

01/01/2016 01/07/2016

Graph showing functional level over time:
- Baseline
- Acute Day 1
- Acute Day 2
- Acute Day 3
- Acute Day 4
- Homecare Day 1

Points labeled A, B, and C:
- A: Expected trend
- B, C: Actual trend

Patient at risk for adverse outcome
Risk Prediction Population Mgmt

Analystics Tool for Functional Trajectory Across Care Continuum: Inpatient user view

B: Current Patients on Neurology floor at JHH as of 1/7/16
C: Predicting Risk of:
   Unplanned ED/unplanned Readmission, if patient is DC'd today
   Using risk prediction algorithm (Last AMPAC<10 & deterioration >= 2)

D: Jones, A, Room 20
   PCP: Rock, Wm
   Ph: (234) 567-8910
   Mobility (AMPAC) 6
   Loss of Mobility -4
   Unplanned ED/Readmission Risk: High

E: Mary C, Room 13
   PCP: Tuske, Ed
   Ph: (234) 567-8910
   Mobility (AMPAC) 18
   Loss of Mobility -2
   Unplanned ED/Readmission Risk: Mod

F: Smyth, A
   DOB: 01/26/5545
   MRN: 3458916
   HC Nurse Mgr: (234) 567-8910
   Referring Physician: (567) 891-0112
   Loss of Mobility -6
   Adverse Outcome Risk: High
   PT is receiving Home PT
   Home OT

G: Reddick K
   DOB: 01/26/5545
   MRN: 3458916
   HC Nurse Mgr: (234) 567-8910
   Referring Physician: (567) 891-1101
   Loss of Mobility -2
   Adverse Outcome Risk: Mod
   PT is receiving Home PT
   Home OT

H: Cat, J
   DOB: 01/26/5545
   MRN: 3458916
   HC Nurse Mgr: (410) 567-7770
   Referring Physician: (567) 891-0112
   Loss of Mobility 0
   Adverse Outcome Risk: Mod
   PT is receiving Home PT
   Home OT

AMPAC: Activity Measure for Post Acute-Care
Rough DB Whiteboarding

**USER**
- ID
- FNAME
- LNAME
- ROLE_ID
- SHED_ID
- LAST_ORDER_ID

**ROLE**
- ID
- NAME

**ORDER**
- ID
- PATIENT_ID
- TIMESTAMP
- Order_Make
- Created_AT
- PI_SLIID
- OT_UID

**PATIENT**
- ID
- UNIT
- ROOM
- ADMISSION_DATE
- EXP_DISCHARGE_DATE
- PT_PRIORITY
- OT_PRIORITY

**AMRC_TRACK**
- ID
- PATIENT_ID
- AMPAC
- PILOT
- RECEIVE_DATE
- ORDER_ID
DB Implementation

ActiveRecord::Schema.define(version: '20160330171204') do
  create_table "ampac_questions", force: :cascade do |t|
    t.string "type"
    t.string "question"
    t.datetime "created_at", null: false
    t.datetime "updated_at", null: false
  end

  create_table "ampac_scores", force: :cascade do |t|
    t.integer "ampac_question_id"
    t.integer "score_number"
    t.integer "visit_id"
    t.datetime "created_at", null: false
    t.datetime "updated_at", null: false
  end

  add_index "ampac_scores", ["ampac_question_id"], name: "index_ampac_scores_on_ampac_question_id"
  add_index "ampac_scores", ["visit_id"], name: "index_ampac_scores_on_visit_id"

  create_table "order_types", force: :cascade do |t|
    t.string "order_type"
    t.datetime "created_at", null: false
    t.datetime "updated_at", null: false
  end

  create_table "orders", force: :cascade do |t|
    t.integer "patient_id"
    t.datetime "order_made"
    t.integer "user_id"
    t.integer "order_type_id"
    t.datetime "created_at", null: false
    t.datetime "updated_at", null: false
  end

  add_index "orders", ["order_type_id"], name: "index_orders_on_order_type_id"
  add_index "orders", ["patient_id"], name: "index_orders_on_patient_id"
  add_index "orders", ["user_id"], name: "index_orders_on_user_id"
DB Record Population

1171, 9/26/16, 9/5/16, 22,677/B/16, Acuna, BMC NEUROSCIENCE CC (5-7x per wk), Daily,
11328,, 557/A,, Adair, BMC MEDICINE A, 9/24/16, "Michael Wh" 11866, 9/26/16, 642/A, 8, Adam, BMC SURGICAL FLOOR, Emily J.
11239, 9/26/16, M002/A, 21, Adams, BMC MEDICAL ICU, 1-2 session
11723, 9/26/16, 9/26/16, 559/A, 11, Adams, BMC NEUROSCIENCES UNI
11071,, C006/A,, Adamson, BMC CARDIAC ICU, Anne Marie Murphy
11428,, M003/A,, Adcock, BMC MEDICAL ICU, 9/25/16, Nancy R.
11235, 9/26/16, 325/B, 24, Addison, BMC BRIDGEVIEW UNIT, Sar
11105, 9/24/16, 9/10/16, M001/A, 18, Adkins, BMC MEDICAL ICU,
11065, 9/24/16, 9/24/16, 14, 555/B, 11, Adler, BMC MEDICINE A, Pas
11662,, 298/A,, Agee, BMC OB A2W, Emily Jaggi-Kight, 9/17/1
11834, 9/25/16, 9/25/16, 9, 470/A, 6, Agnew, BMC WENZ ORTHO CENTER

~150 Patient + Order records

Ingest, parse, populate
✓ Automated for future migrate
Views implementation

### Patients in Need of Therapy

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>Covering OT/PT</th>
<th>OT/PT Rec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marco Polo</td>
<td>Mike C.</td>
<td>Acute</td>
</tr>
<tr>
<td>J. Hopkins</td>
<td>John A (OT)</td>
<td>Home with Home</td>
</tr>
<tr>
<td>T. Swift</td>
<td>Ray S. (OT)</td>
<td>Subacute Rehab</td>
</tr>
<tr>
<td>K. Bryant</td>
<td>Ray S. (OT)</td>
<td>Subacute Rehab</td>
</tr>
<tr>
<td>B. Knowles</td>
<td>Amita S. (PT)</td>
<td>Outpatient PT</td>
</tr>
<tr>
<td>Z. Deschanell</td>
<td>Christine M.</td>
<td>TBD</td>
</tr>
</tbody>
</table>

**SICU Floor**

- Referrals per unit: 5
- Assigned PT/OT: Mike C.

© 2016 Johns Hopkins Technology Innovation Center
Deliverables

Minimum
- Create and populate database
- Implement Rails app framework
- PT/OT view and permissions
- Shadow-informed front-end mockups for all users
  - Prioritization algorithm implemented in Rails app

Expected
- Manager view + permissions
- ESB set up and integrated with Rails app
  - Refreshing every 5 mins
- Single-sign-on server configuration

Maximum
- Physician view + permissions
- Deployed at JHBMC
- Tested by PT/OT teams at JHBMC
- Instances deployed or configured to be deployed at non-JH facilities
Milestones

- Data from Epic
  - ESB form to API web services
- Key Use Case run-through (with PT/OT teams)
- MATLAB algorithm deep-dive
- SQL Database schema creation
  - Test seed data
  - Anonymized data
- Rails model creation and setup
- Master UI design
  - Front end charting
  - Front end implementation
- User-specific views design
- Single-sign-on server configuration
- Final Presentation

[Timeline with milestones from 2/9/16 to 5/3/16]