

A Chat Bot Interface for Instant Access to Radiology Departmental Resources

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The Problem

- ▶ Numerous department-specific resources that change over time
- ▶ Learning curve for new residents and faculty
- ▶ Frequent phone calls for repeated questions

The screenshot shows the RadPoint website interface. At the top, there is a navigation bar with the RadPoint logo and several menu items: RESIDENT SCHEDULES, FELLOW SCHEDULES, ATTENDING CALL and MASTER SCHEDULES, SECTION SCHEDULES, and SECTION WEBSITES. Below the navigation bar is the main heading "Site Contents".

The content is organized into three main sections on the left: "General", "Clinical Resources", and "IT Resources".

- General:** Radiology Phone List, MedHub, QGenda, UPHS Webmail, UPHS Intranet, UPHS Phone Book, Penn Rolodoc, Penn Safety Net.
- Clinical Resources:** Hi-IQ, Code Rec, Sectra Uniview, LifeIMAGE, RadPeer, Exam Code, PennChart, Cureatr, Misc. Clinical resources.
- IT Resources:** Capricorn, Montage, Ultrasound Connector, Powerscribe WebPortal, Attestation Work List, Radiology IT Support.

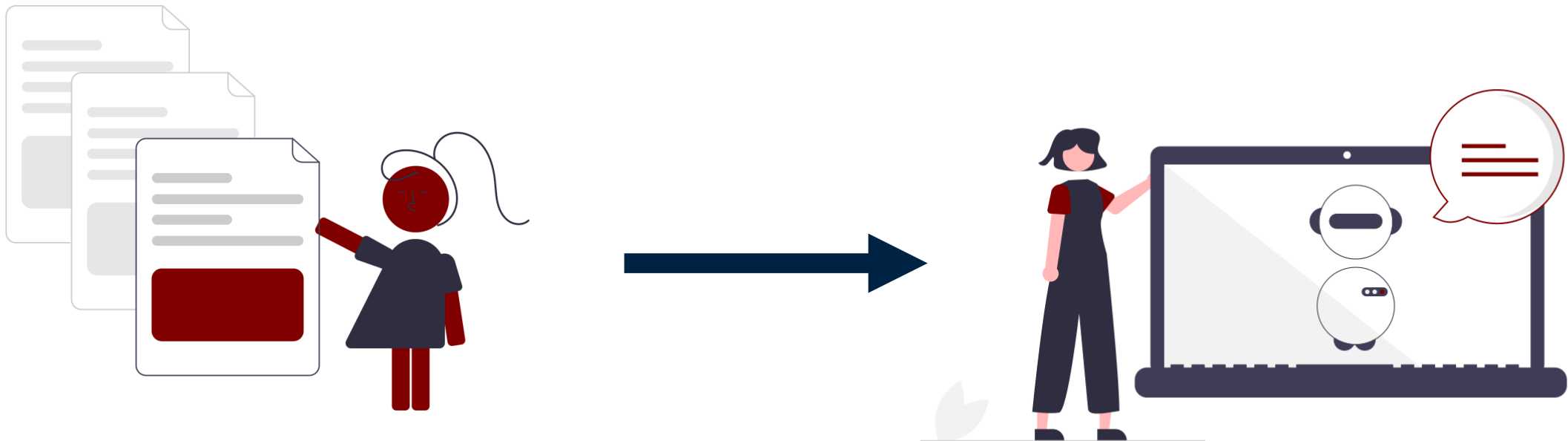
Below these sections is an "Education" section with links like "Misc Education Links", "Poll Everywhere", "Mediasite (Lecture Videos)", and "Mediasite (Phuine)".

The main area of the page is titled "Lists, Libraries, and other Apps" and contains a grid of 12 resource cards. Each card features an icon (megaphone, calendar, folder, or document) and text indicating the name of the resource, the number of items, and when it was last modified.

| Resource Name | Icon | Items | Last Modified |
|---|-----------|-------------|-----------------------|
| 3D CV Worklist | Megaphone | 10209 items | Modified 2 months ago |
| 3D Lab Schedule | Calendar | 276 items | Modified 2 months ago |
| 3D Neuro Worklist | Megaphone | 29 items | Modified 2 months ago |
| Abdominal Patient Care Team | Folder | 674 items | Modified 4 weeks ago |
| Announcements | Megaphone | 61 items | Modified 32 hours ago |
| Attending Call (Weekday ER & Weekend AM) | Calendar | 2010 items | Modified 2 months ago |
| Attending Weekend Chest Call | Calendar | 1010 items | Modified 2 months ago |
| Awards and Grants | Folder | 8 items | Modified 2 months ago |
| Body MR | Folder | 406 items | Modified 4 weeks ago |
| Body MRI | Calendar | 198 items | Modified 2 months ago |
| Breast Imaging Network Practice Optimization Team | Folder | 160 items | Modified 8 days ago |
| Calendar | Calendar | 0 items | Modified 2 months ago |
| Call Guides | Folder | 11 items | Modified 8 days ago |
| Cardiac MRI Reading List | Folder | 77 items | Modified 2 months ago |
| Chest Patient Care Team | Folder | 259 items | Modified 11 days ago |
| Chest Wiki | Folder | 5 items | Modified 3 weeks ago |
| Clinical Research Plan (restricted) | Folder | 1 item | Modified 2 months ago |
| CME/Faculty | Folder | 385 items | Modified 2 months ago |
| Code Abdomen | Folder | 3 items | Modified 2 months ago |
| coders | Folder | 7 items | Modified 2 months ago |
| Conference Travel Guide | Folder | 2 items | Modified 2 months ago |

The Solution

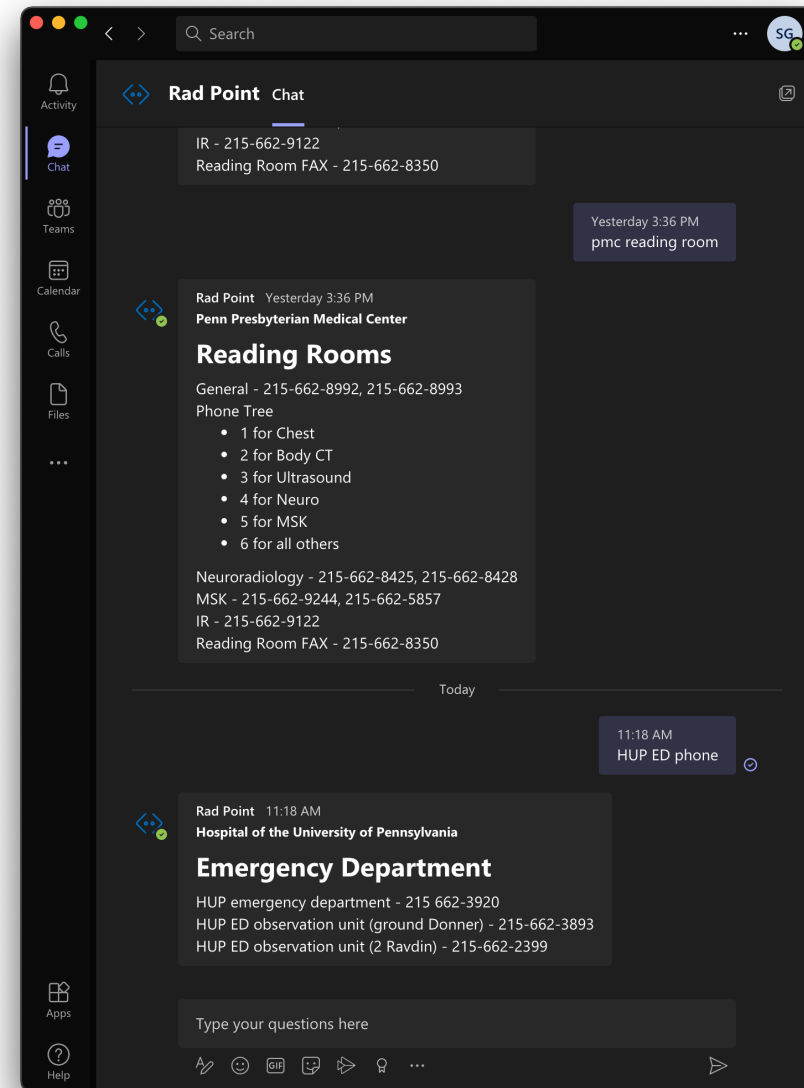
- ▶ Can an automated chat bot provide relevant information to staff?
 - Instant access to department resources
 - Guided walkthroughs for complex data retrieval



Methods

- ▶ Cloud Computing
 - Microsoft Azure
 - Azure Bot Service
 - QnA Maker
- ▶ Custom Code
 - JavaScript
 - Interacts with Azure Bot Service
- ▶ User Interface
 - Microsoft Teams
 - Web chat

```
JS serviceFinderDialog.js 1 X JS cvdiDialog.js JS cardiacMRDialog.js JS RootDialog.js JS bot.js JS index.js
dialogs > JS serviceFinderDialog.js > ServiceFinderDialog > hospitalStep
76
77   async bodyRegionValidator(promptContext) {
78     const bodyRegionIndex = util.getIndexOfPromptInput(promptContext.recognized.value,
79     if (bodyRegionIndex >= 0 && bodyRegionIndex < promptContext.options.choices.length)
80       promptContext.recognized.value = promptContext.options.choices[bodyRegionIndex]
81       return true;
82     } else {
83       return false;
84     }
85   }
86 }
87
88   async hospitalStep(step) {
89     // Filter radiology services by previous step response
90     if (step.result) {
91       step.values.radiologyServices = _.filter(step.values.radiologyServices, ['bodyR
92     }
93     // Skip to the next step if only one matching radiology service is left
94     if (step.values.radiologyServices.length === 1) {
95       return await step.next();
96     } else {
97       const hospitals = _.chain(step.values.radiologyServices)
98         .map('hospital')
99         .flatten()
```



Results

10:22 PM
sectra is down

Rad Bot 10:22 PM
[QnA Maker]: **If Sectra PACS is unavailable:**

1. Immediately call the single point of contact (SPOC) support line select option #1.
2. If SPOC is unable to bring the system back up within 30 minutes (15 minutes for STAT exams), call SPOC again to confirm that you should begin using Terarecon.
3. If necessary, remind technologists to send images to downtime destination.
4. Start Terarecon, which is installed on all PACS workstations in the department. In the event of a problem using Terarecon, contact the SPOC support line select option #1.
5. Use the PennChart Radiant work list to select cases. Launch the cases manually on Terarecon for interpretation.
6. Referring providers will need to visit the reading room if they wish to view images.

Did this answer your question?

Yes! No :(

10:38 PM
cardiac mr

Rad Bot 10:38 PM
What is the indication for the cardiac MR?

1. HOCM
2. Congenital heart disease
3. Valvular heart disease
4. Other

10:38 PM
valvular

Rad Bot 10:38 PM
Cardiac MR for Morphology and Function

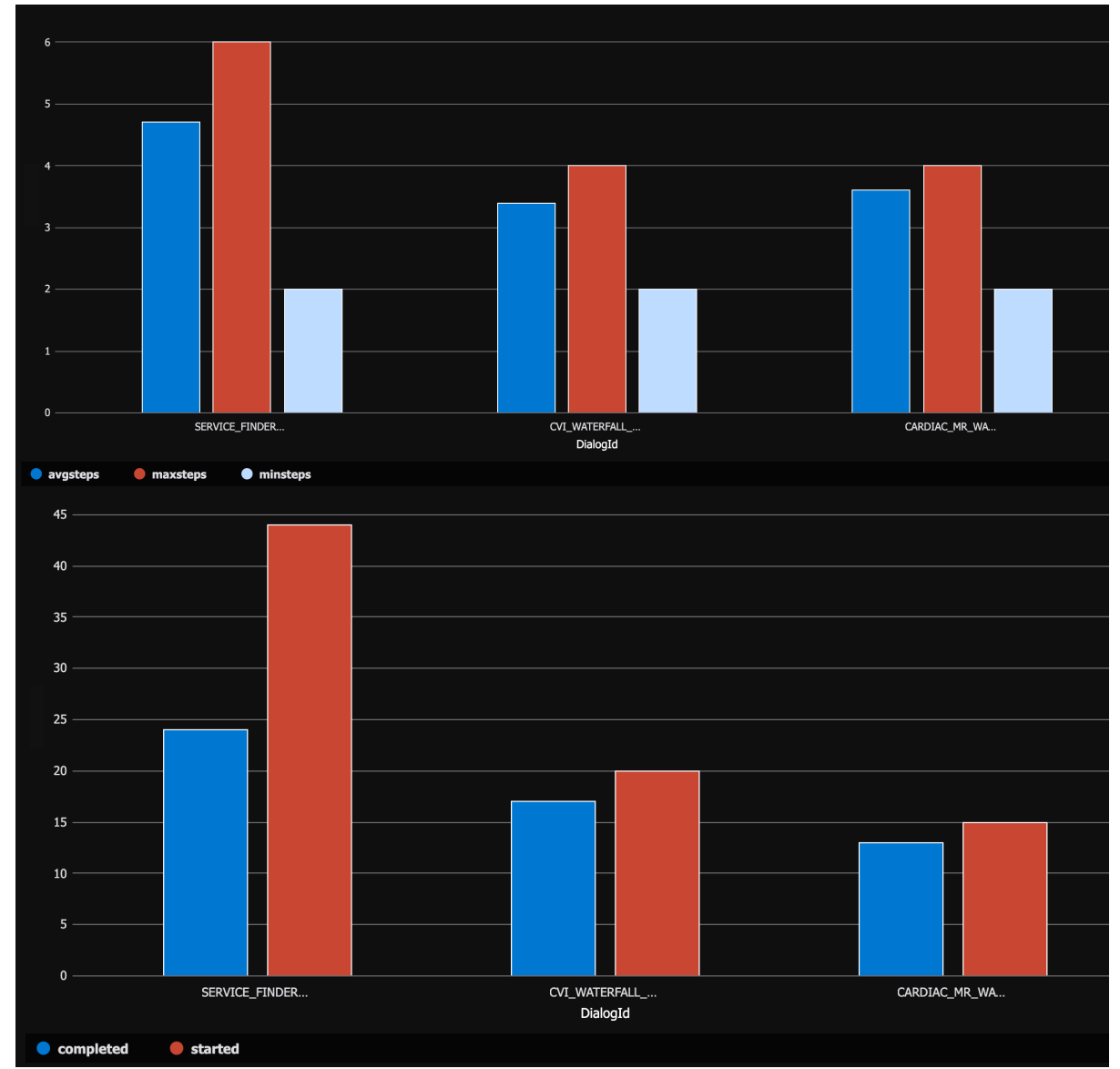
- HUP exam code: MRHRCZ
- CPT code: 75561

Phase Contrast Flow Images

- HUP exam code: MRHRVEFLZ
- CPT code: 75565

Results

| Metric | Count |
|---------------------------------|-------------|
| Conversations completed | 51/79 (65%) |
| Successfully answered question? | 25/26 (96%) |
| Mean turns per conversation | 3.6 |
| Median conversation duration | 7.8 s |
| Development time | 42.5 hrs |
| Approximate compute cost | \$65/month |



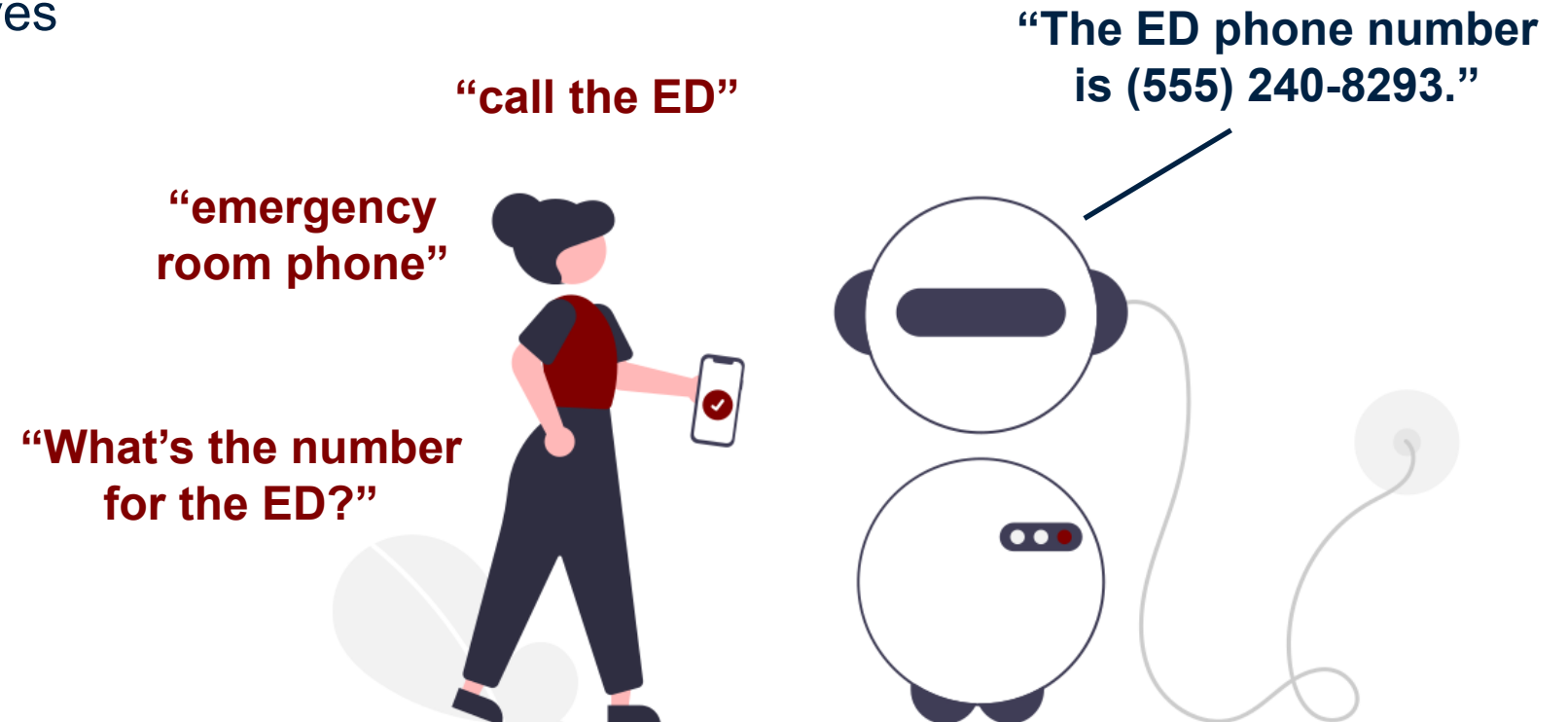
Discussion & Lessons Learned

- ▶ Meet users where they are
 - Built into Microsoft Teams (department standard)
 - No new apps to download
- ▶ Favor guided interactions
 - Prompt users with tasks the chat bot can do
 - Multiple-choice answers to avoid misinterpreting user input
- ▶ Use open-ended queries as a backup



Future Directions

- ▶ Natural language processing (NLP)
 - Handle spelling/language variations
 - No bot-specific syntax to learn
- ▶ Zero/minimal code alternatives



Thanks!
Questions or comments?

