Iterative Design of a System for Programming **Socially Interactive Service Robots**

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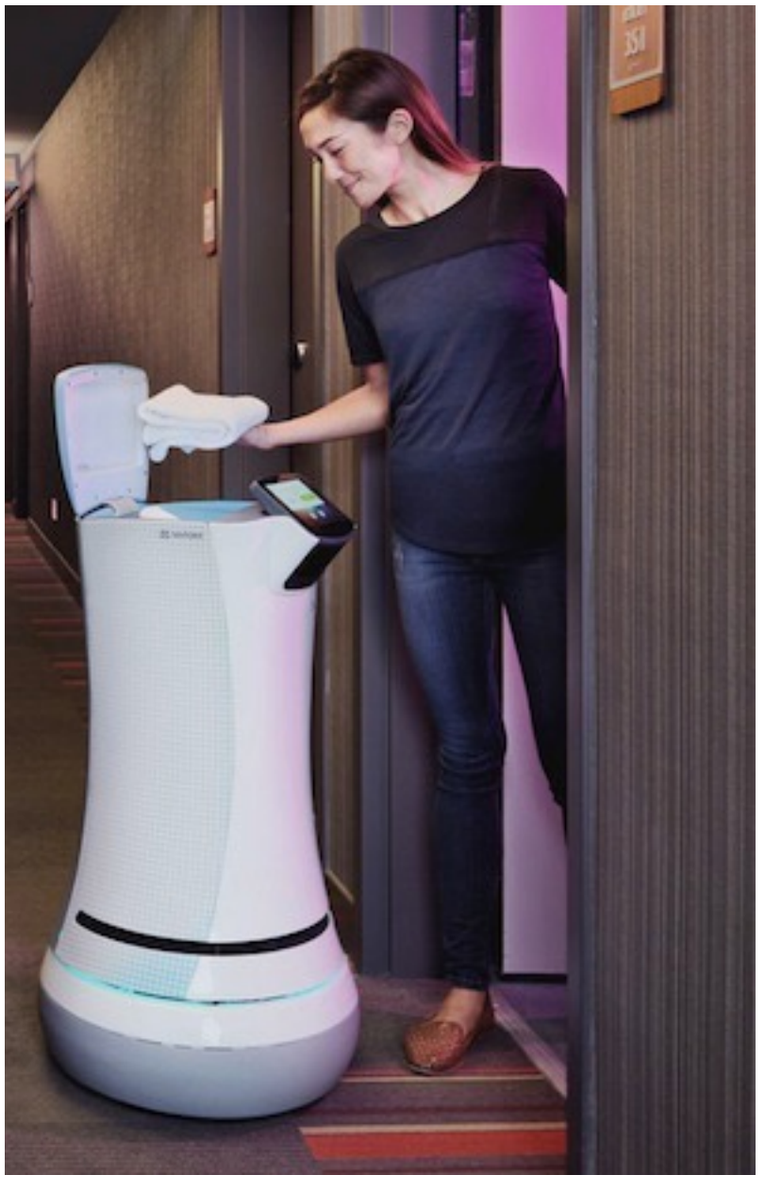
Aethon TUG

Vecna QC Bot



Savioke Relay

WALLY
THE BUTLER
at your service
Residence
Inn
Marriott

Research Question

How can we design a programming system for service robots to support socially interactive behaviors?

Approach

1. Formative Study
2. *iCustomPrograms*
3. Field Study 1
4. Enhancements
5. Field Study 2

Formative Study

Procedure

- Analyzed “wish-list” data
- 5 Savioke customers (4 hotels, 1 airport)
- Most (4/5) used Relay for at least 2 months

Use Cases

- People Delight
- Service Recovery
- Mobile Kiosk
- Demo

iCustomPrograms

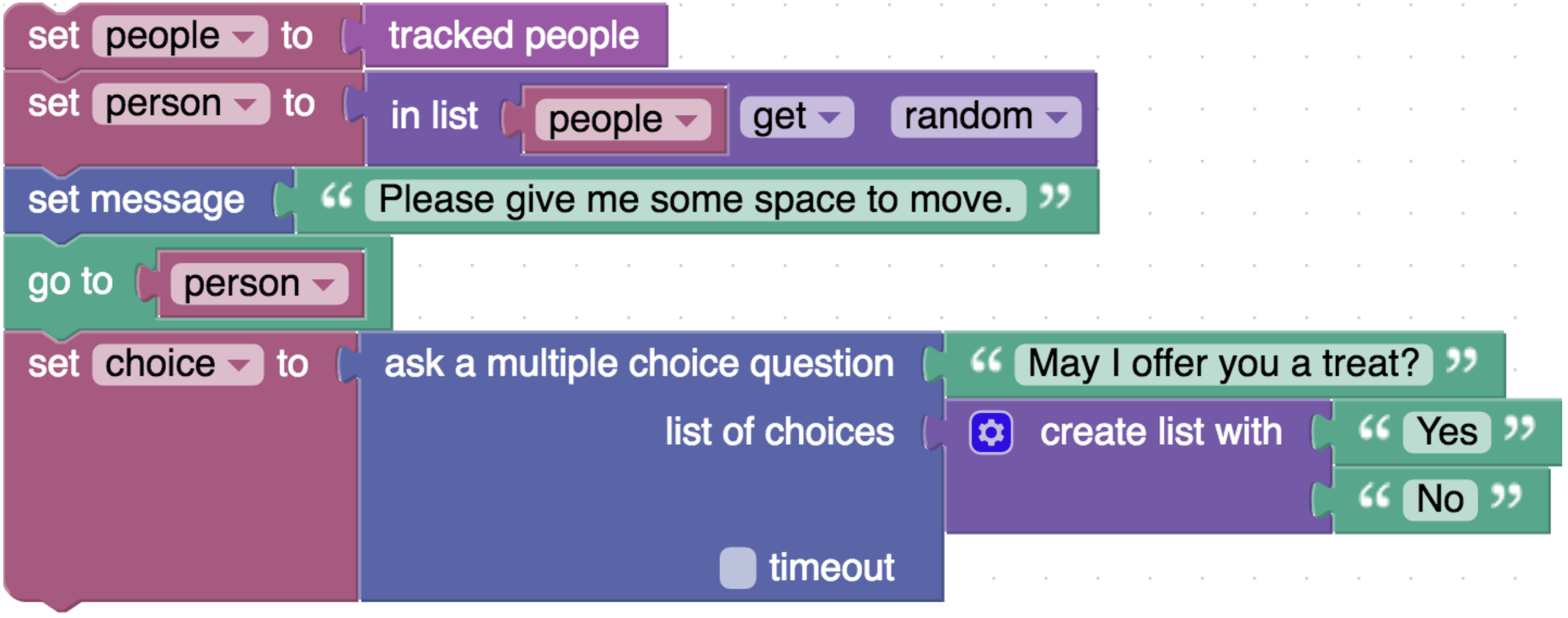
CustomPrograms

- *iCustomPrograms* extends *CustomPrograms* (Huang et al. HRI 2016) with emphasis on *interactive* behaviors.

- *CustomPrograms* is composed of
  1. Primitives: e.g. nav, user interaction, bin, …
  2. Blocky: visual programming interface

Approaching People

name	returns
findPeople()	List



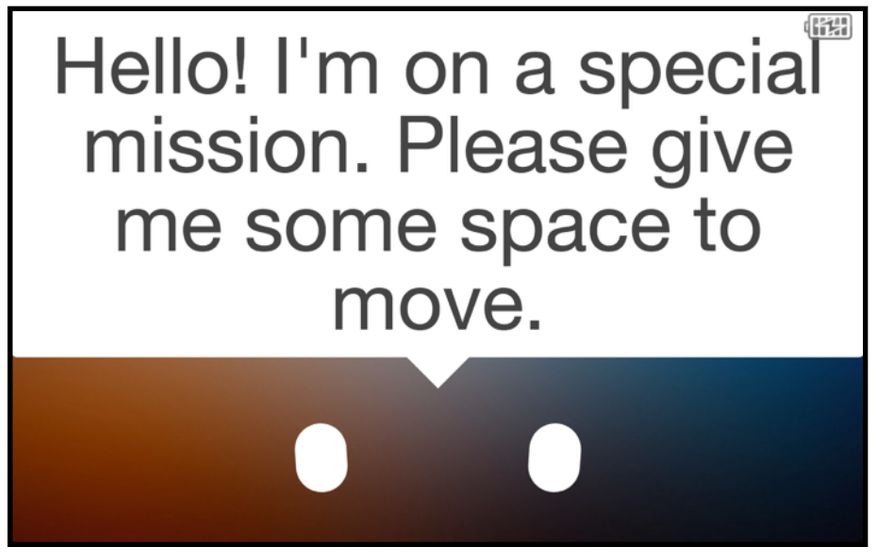
Field Study 1

Study at Airport

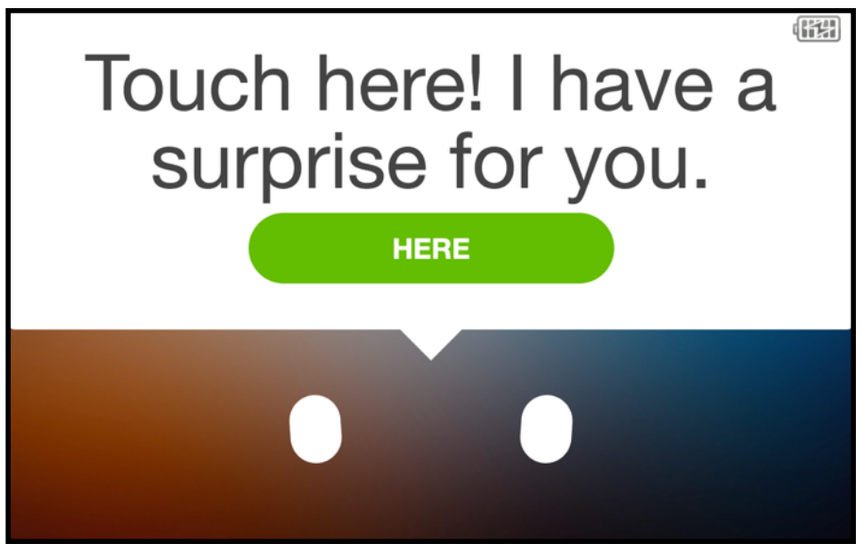
- Held in the property of the airport customer (A5)
- Design and implemented two interactive applications with the airport staff using *iCustomPrograms*
- Deployed 4 times (3-4hrs each) over 2 weeks
  - monitored by the staff and Savioke employees

People Delight

1. Go to a pre-defined location
2. Wait for a person to interact
3. Approach a (found) person and wait for them to interact
4. Repeat



Screen while moving



Screen while waiting

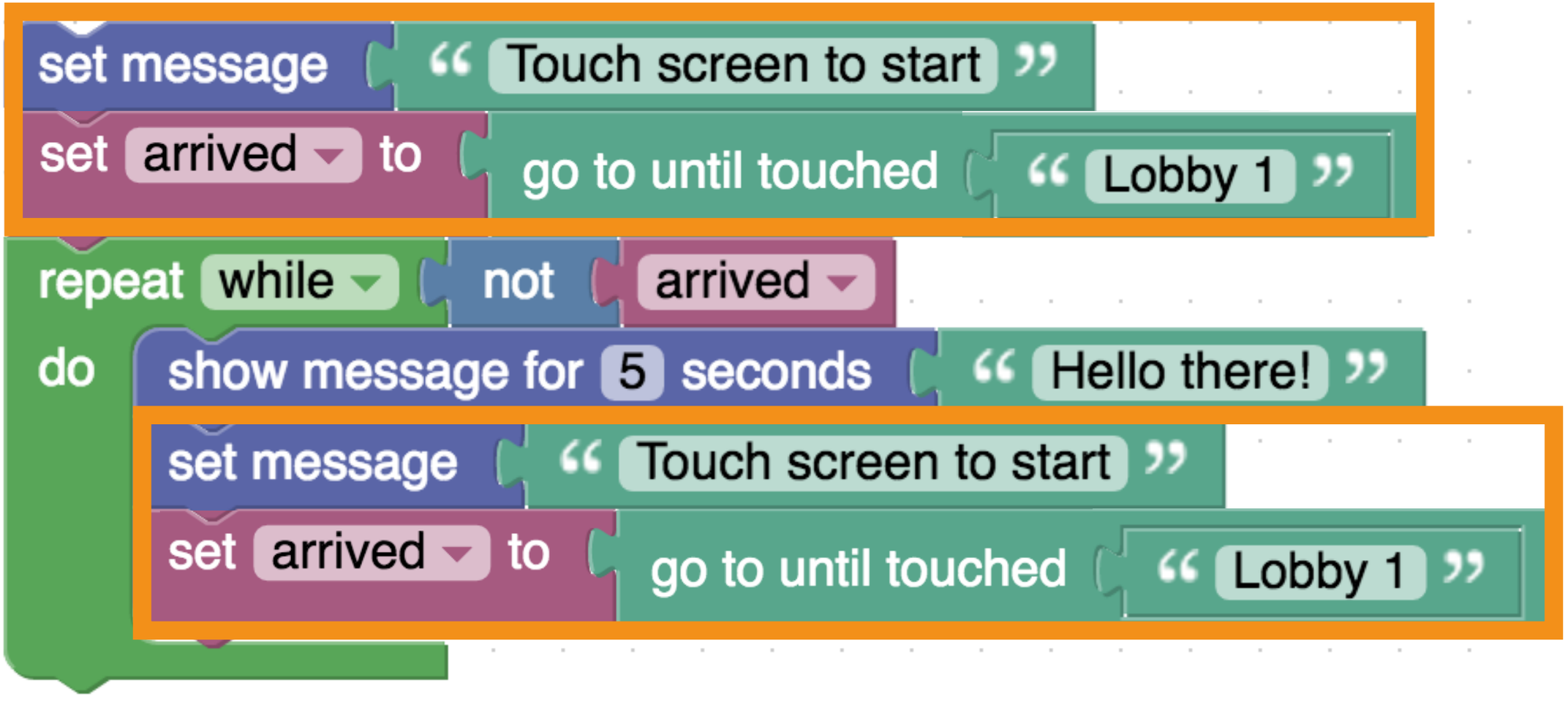
Findings

- Problems with approaching people
- Initiating interactions via moments and sounds
- Desire for richer control over interactive primitives

Enhancements

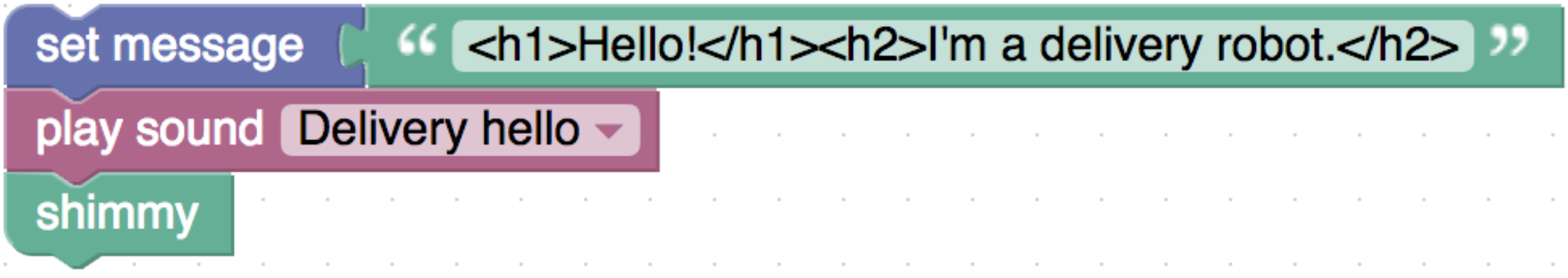
Touch-to-Start

name	**Returns**
goToUntil(string location)	bool



Richer Control over Interactive Primitives

name	**Returns**
displayMessage(string htmlText)	void
askMultipleChoices(string htmlText, string[] choices)	string
…	
playSound(string sound)	void



Field Study 2

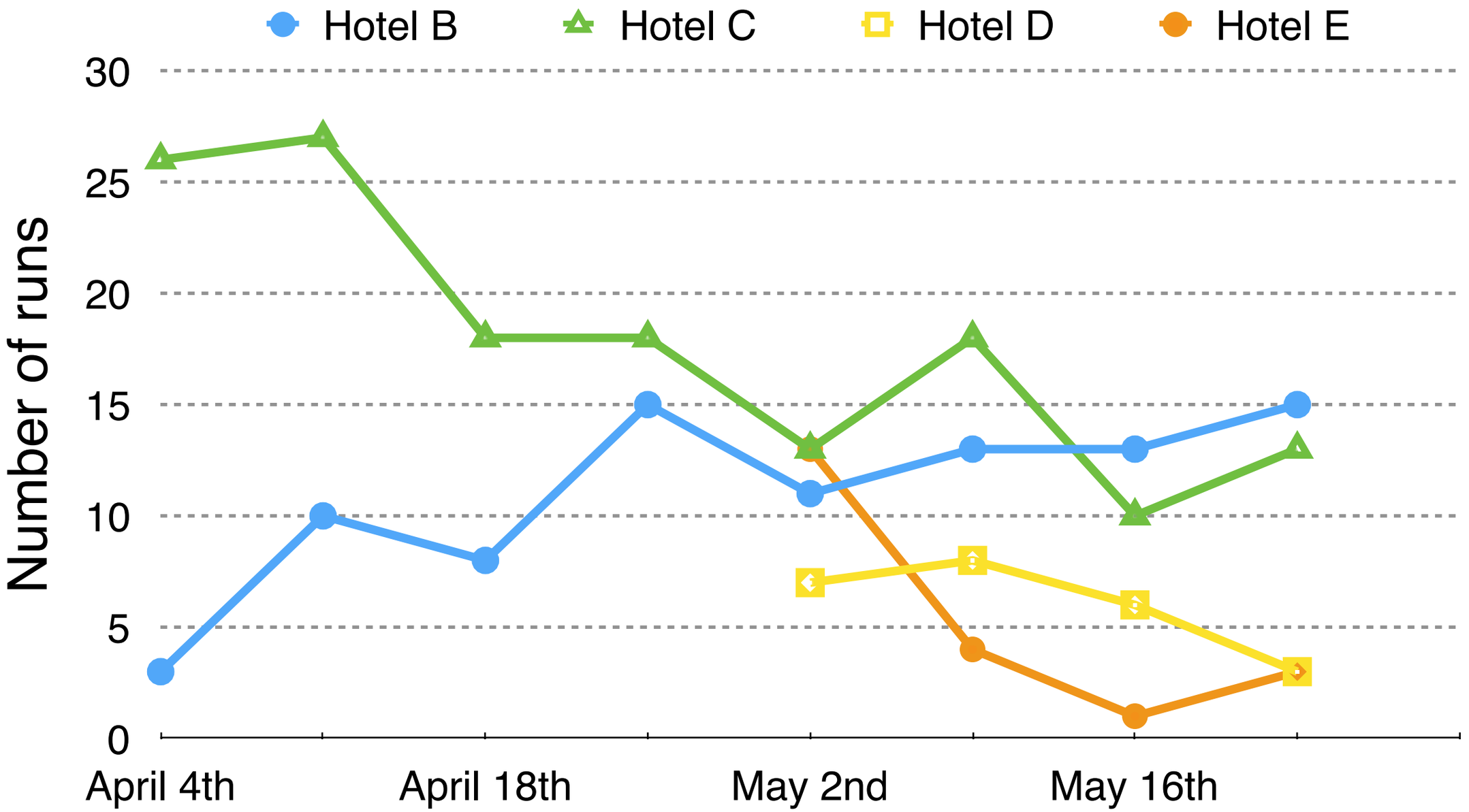
Usage in Airport

- 9am-5pm over Easter and local holiday weekends
- ~500 passengers interacted over each weekends
- Most popular among children (7 or up), group travelers, and young adults

Pictures from the Easter weekend

Pictures from the local holiday weekend

Usage in Hotels



Summary

- To support interactive behaviors, the system must support
  - people aware behaviors (proactive & passive)
  - rich control over user interaction components
- We demonstrated the interactivity of *iCustomPrograms* applications in the field.