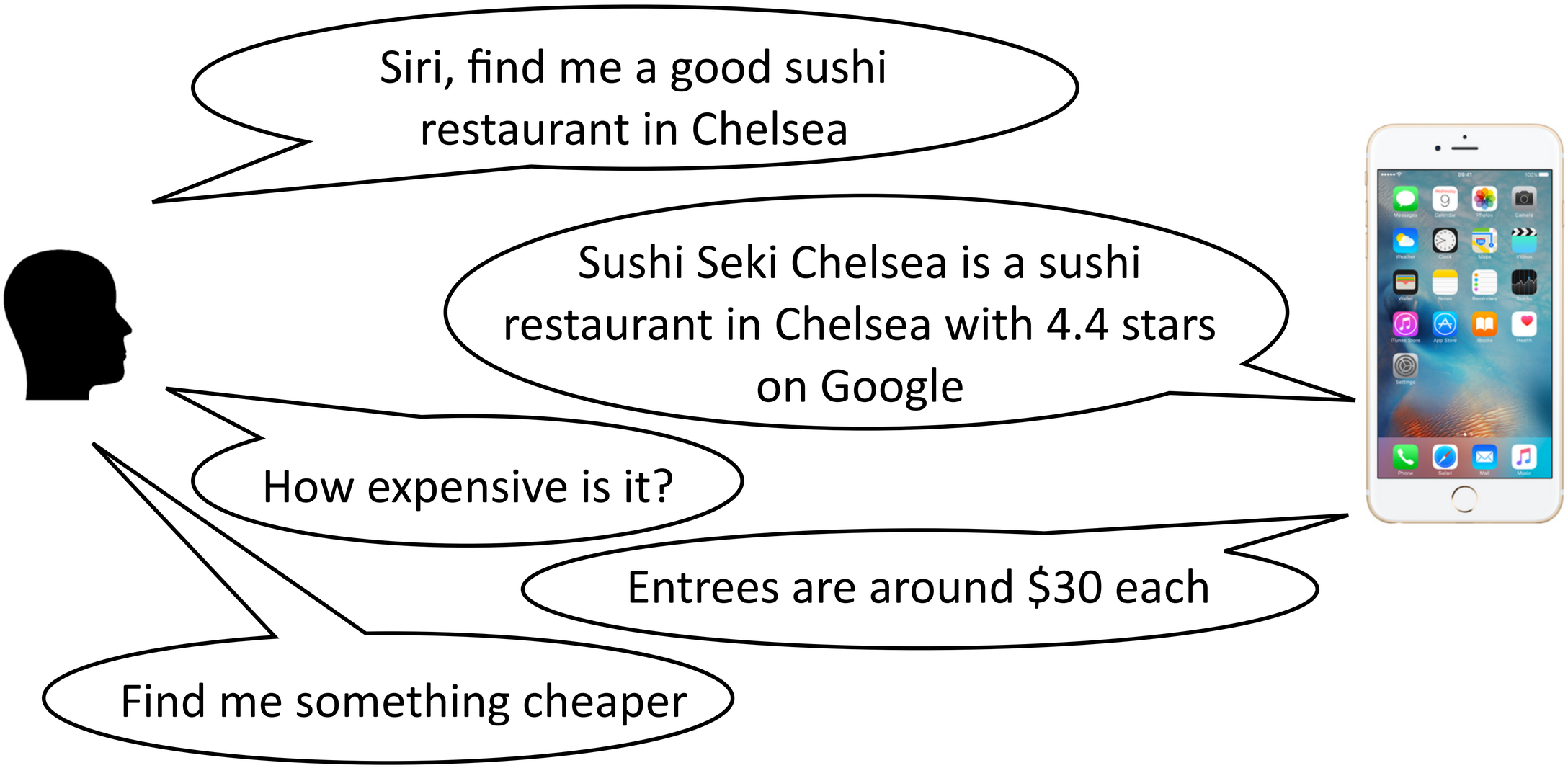
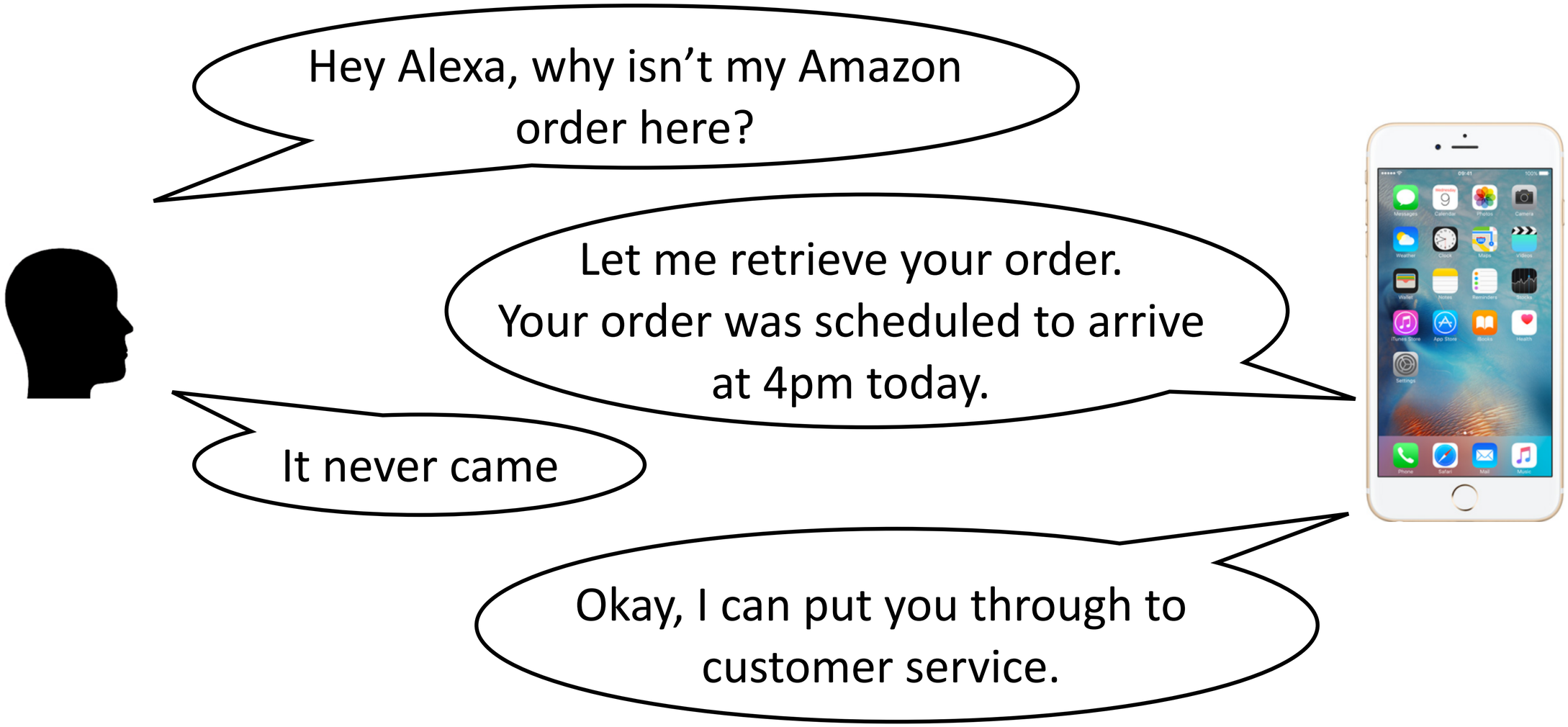
Task-oriented Dialogue

- Personal assistants / API front-ends:



Task-oriented Dialogue

- Customer service:



ATIS

- Given an utterance, predict a domain-specific semantic interpretation

Utterance	*How much is the cheapest flight from Boston to New York tomorrow morning?*
Goal:	Airfare
Cost_Relative	*cheapest*
Depart_City	*Boston*
Arrival_City	*New York*
Depart_Date.Relative	*tomorrow*
Depart_Time.Period	*morning*

- Can formulate as semantic parsing, but simple slot-filling solutions (classifiers) work well too

DARPA (early 1990s), Figure from Tur et al. (2010)

Intents

- 29 different intents

which flights go from cleveland to indianapolis on april fifth

Intent: flight

does tacoma airport offer transportation from the airport to the downtown area

Intent: ground_service

what days of the week do flights from san jose to nashville fly on

Intent: day_name

what meals are served on american flight 811 from tampa to milwaukee

Intent: meal

Full Dialogue Task

Find me a good sushi restaurant in Chelsea

```
restaurant_type <- sushi
location <- Chelsea
curr_result <- execute_search()
```

Sushi Seki Chelsea is a sushi restaurant in Chelsea with 4.4 stars on Google

How expensive is it?

```
get_value(cost, curr_result)
```

Entrees are around $30 each

- Involves slot filling, API calls, and generation

Dataflow Graphs for Dialogue

(1)

User: *Where is my meeting at 2 this afternoon?*

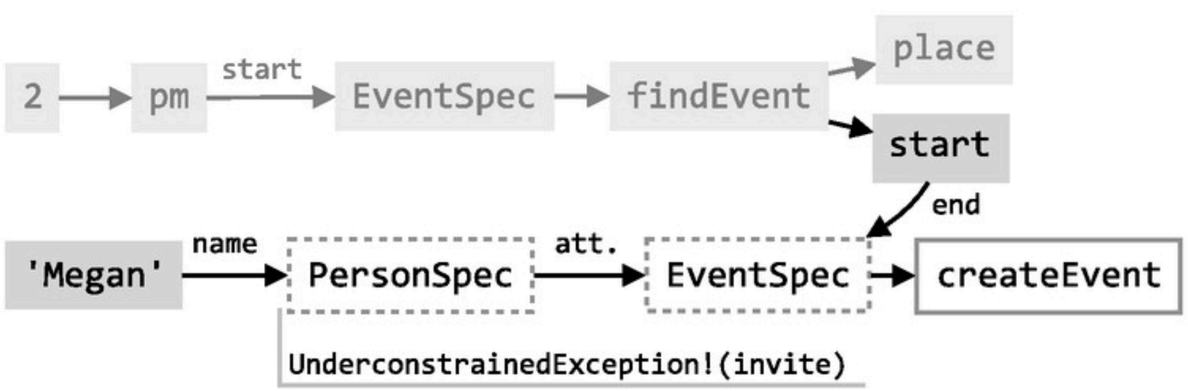
```
place(findEvent(EventSpec(start=pm(2))))
```

Agent: *It's in Conference Room D.*

(2)

User: *Can you create a meeting with Megan right before that starts?*

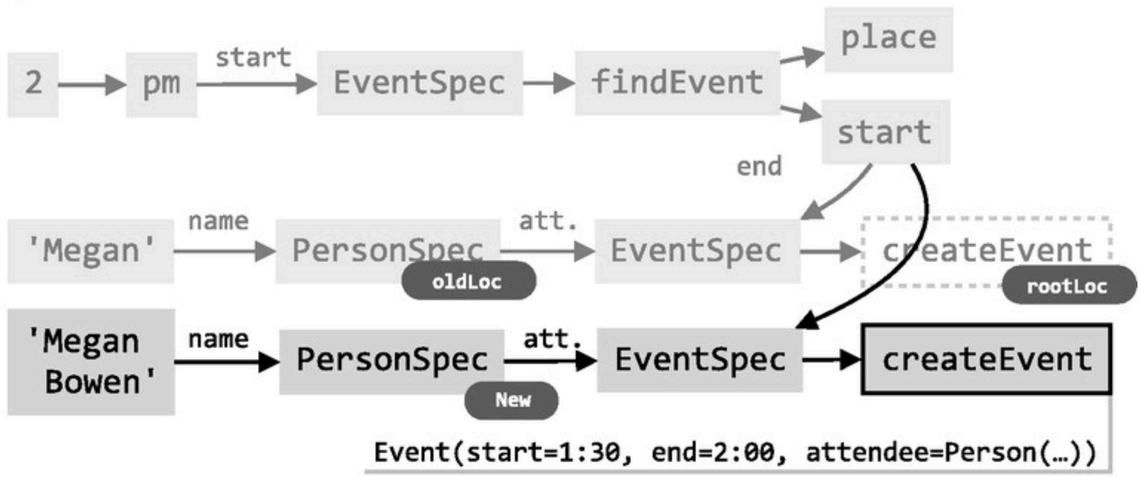
```
createEvent(EventSpec(
  end=start(refer(Constraint[Event])),
  attendee=PersonSpec(name='Megan')
))
```



Agent: *Which person named Megan did you mean?*

User: *Megan Bowen.*

```
revise(
  new=PersonSpec(name='Megan Bowen'),
  oldLoc=Constraint[PersonSpec](),
  rootLoc=RoleConstraint(output)
)
```



Agent: *Ok, I'll book a meeting with Megan Bowen from 1:30 to 2:00 pm today.*

Semantic Machines; Andreas et al. (2020)

Training Dialogue Models

- Learning from demonstrations: “wizard” pulls the levers and makes the dialogue system update its state and take actions

Find me a good sushi restaurant in Chelsea

wizard enters these

```
restaurant_type <- sushi
location <- Chelsea
curr_result <- execute_search()
```

wizard types this out or invokes templates

Sushi Seki Chelsea is a sushi restaurant in Chelsea with 4.4 stars on Google

Goal-oriented Dialogue

- Tons of industry interest!
- Dozens of startups + medium-sized companies in this space
- Big Companies: Apple Siri, Google Assistant, Amazon Alexa, Microsoft Cortana/Semantic Machines, Facebook, Samsung Bixby, Tencent WeChat, ASAPP