



The Art of Coding a Conversation

Designing Bots



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YOU GET A BOT, YOU GET A BOT



EVERYONE GETS A BOT



**problems
customers
have**

**problems
your bots
solve**

Credit: @davidjbland

Explosive growth



10,000,000+ messages/day

1,000,000+ unique users/day

190,000+ developers

14,000+ active bots

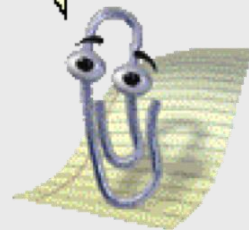
1,000+ companies

100+ new features (so far!) this year

It looks like you're writing a letter.

Would you like help?

- ☒ Get help with writing the letter
- ☒ Just type the letter without help
- ☐ Don't show me this tip again



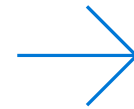
Meet Xiaoice, Rinna and Zo



China
小冰
2014



Japan
りんな
2015



US
Zo
Today

Balancing IQ and EQ

Cortana & Chatbots



Factors that DO NOT guarantee bot's success

- How “smart” the bot is
 - No correlation between a bot's intelligence and user adoption of the bot
- How much natural language the bot supports
 - Some bots have no conversational capability at all, that's perfectly fine.
- Voice
 - Privacy/Channel/Environment/Noise?

Most successful apps or websites have at least
one thing in common:

A Great User Experience.

Four Questions to Success

- Does the bot easily solve the user's problem with the minimum number of steps?
- Does the bot solve the user's problem better/easier/faster than any of the alternative experiences?
- Does the bot run on the devices and platforms the user cares about?
- Is the bot discoverable? Do the users naturally know what to do when using it?

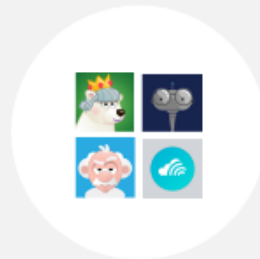
UX and UI

UX FOR BOTS

BOTS ARE YOUR VOICE



REFLECTING YOUR BRAND



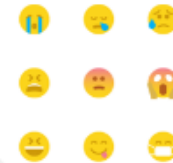
How do I look?

Just like a mobile app your bot icon is really important.

Cami

What's my name?

Think about your name and how it reflects your brand and the type of bot you are designing.



How should I sound?

Tone of voice is the primary way you will inject your brand into a bot.



When should I ask for help?

No matter how smart your bot is, there will be cases where you still need to let a human take control of the conversation.

Scenarios

Goals



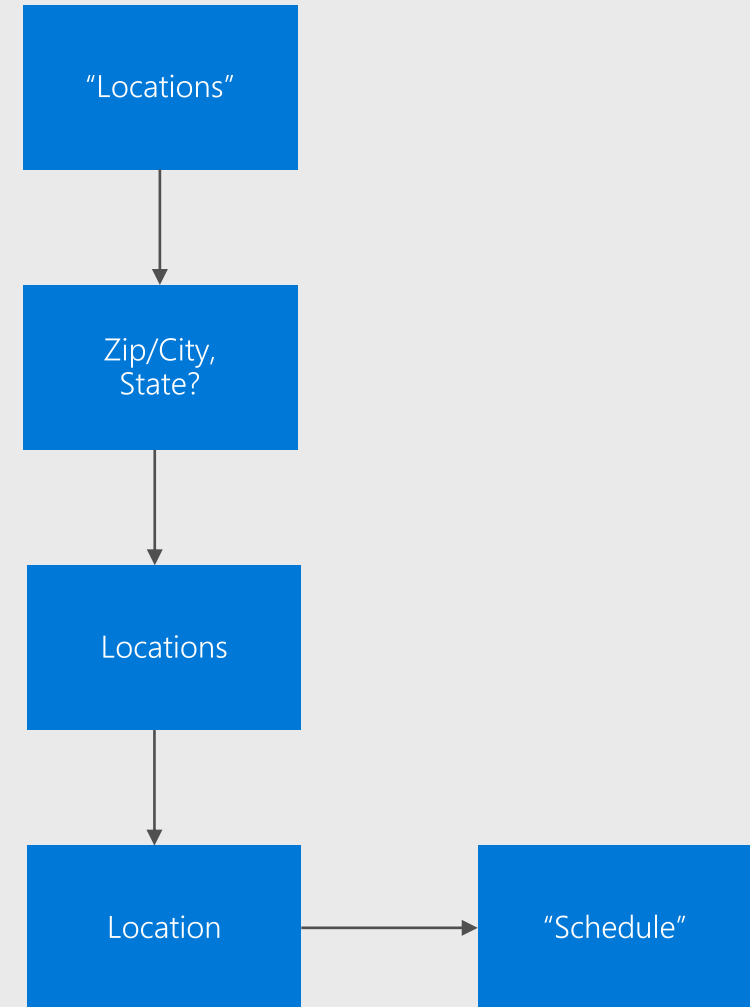
User Stories

UX and UI Design

- Conversation Flow
 - Layout of conversation
 - High-level structure of the conversation
- Conversation UI
 - Layout, interaction, visual, motion design of the dialogue
 - Detailed design of the dialogue

Conversation Flow design

- Structure of conversation
 - Guides the conversation
 - Completion of a user story
- Storyboard, walk through with stakeholders



Conversation “UI Controls”

- Text
 - Markdown
- Buttons
- Cards
 - Hero
 - Thumbnail
 - Adaptive
- Carousel
- Media
 - Images
 - Audio
 - Video

What's your zip code ('98052'), or city and state ('Redmond, WA')?

98052

Want me to have someone (a human) message you about this problem?

Yes

No

Redmond

Redmond

1 Microsoft Way, Redmond, WA

Open today until 9 PM

Schedule

More Locations

Map

Directions

We're located in the historic Fabrikam building downtown in the center of it all.

Directions

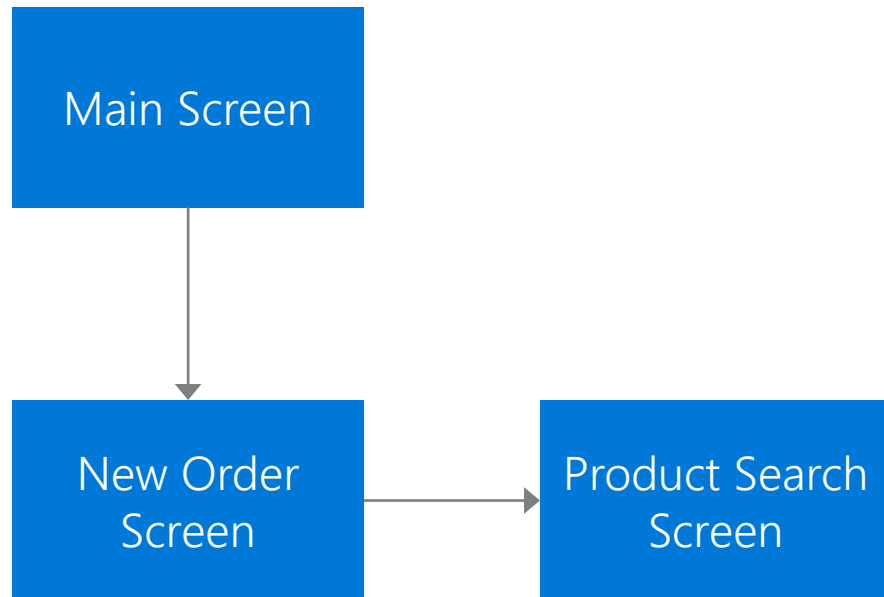
Conversation UI design principles

- Design to be understood
- Design to understand
- Design to learn, remember

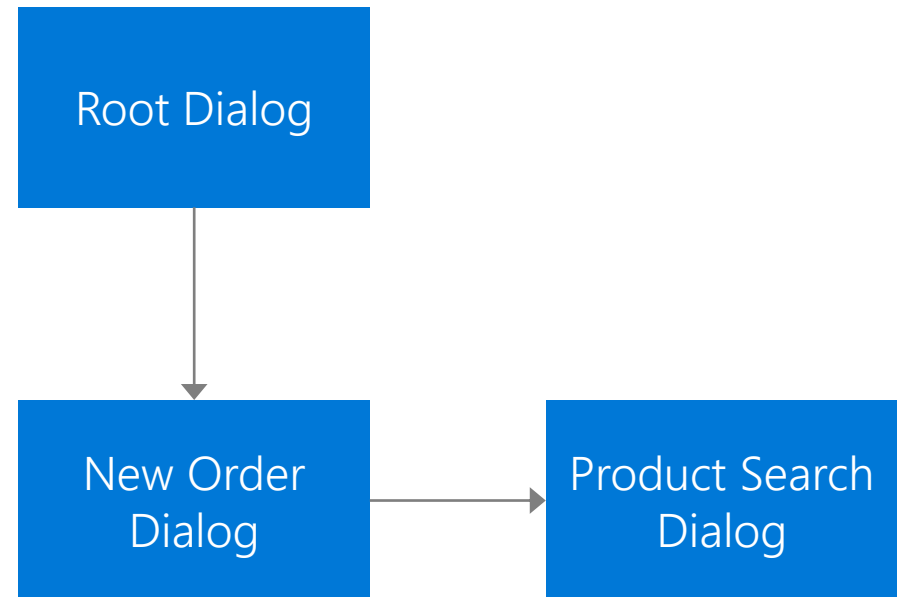
Dialogs are for bots like screens are for apps

They separate concerns and organize flows, exactly the same way:

Traditional Application



Bot



Adaptive Cards



OPEN FRAMEWORK
MULTIPLE CANVASES

Card created: Publish Adaptive Card schema



Miguel Garcia

Created Monday, February 13, 2017 10:08:39 ...

Now that we have define the main rules and features of the format, we need to produce a schema and ...

Board: Adaptive Card
List: Backlog
Assigned to: David Claux
Due date: Not set

Set due da...

Comment

View

Card created: Publish Adaptive Card schema



Miguel Garcia

Created Monday, February 13, 2017 10:08:39 PM

Now that we have define the main rules and features of the format, we need to produce a schema and publish it to GitHub. The schema will be the starting point of our reference documentation.

Board: Adaptive Card
List: Backlog
Assigned to: David Claux
Due date: Not set

Set due date

Comment

View

Card created: Publish Adaptive Card schema



Miguel Garcia

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Notifications

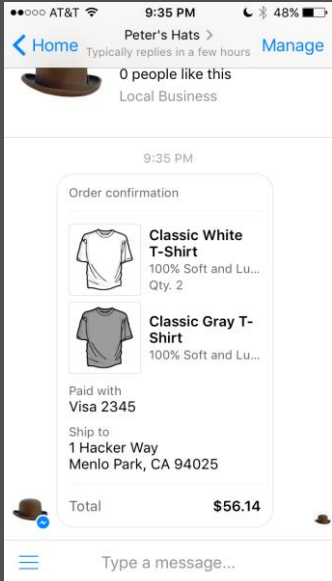
Microsoft Teams

Skype

Android

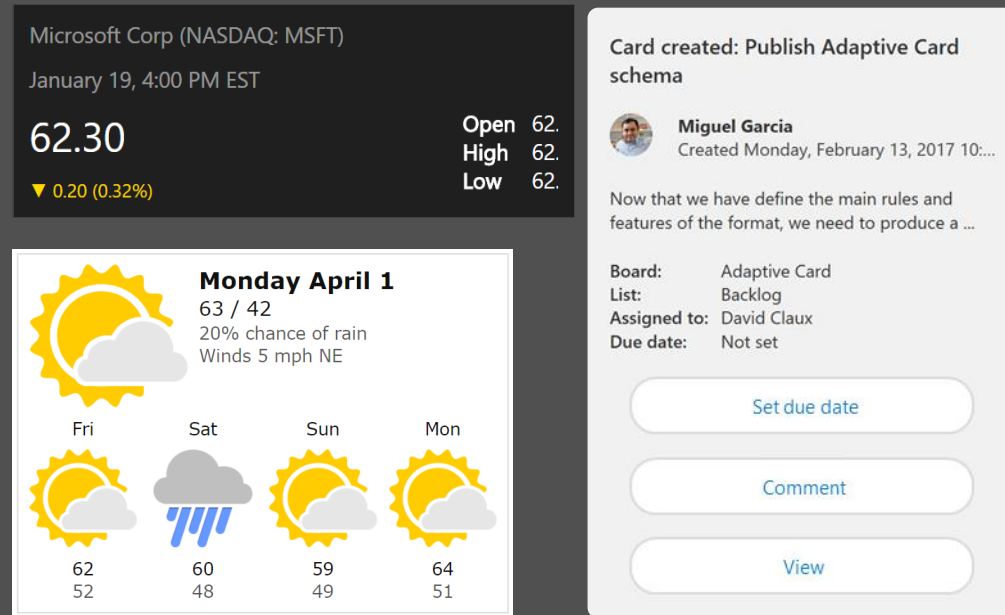
iOS

Filling the middle ground



Fixed templates

Complete control
No flexibility
Update Treadmill



Adaptive Cards

Flexible enough payload to cover 80% of needs
Host maintains strong control over style and security

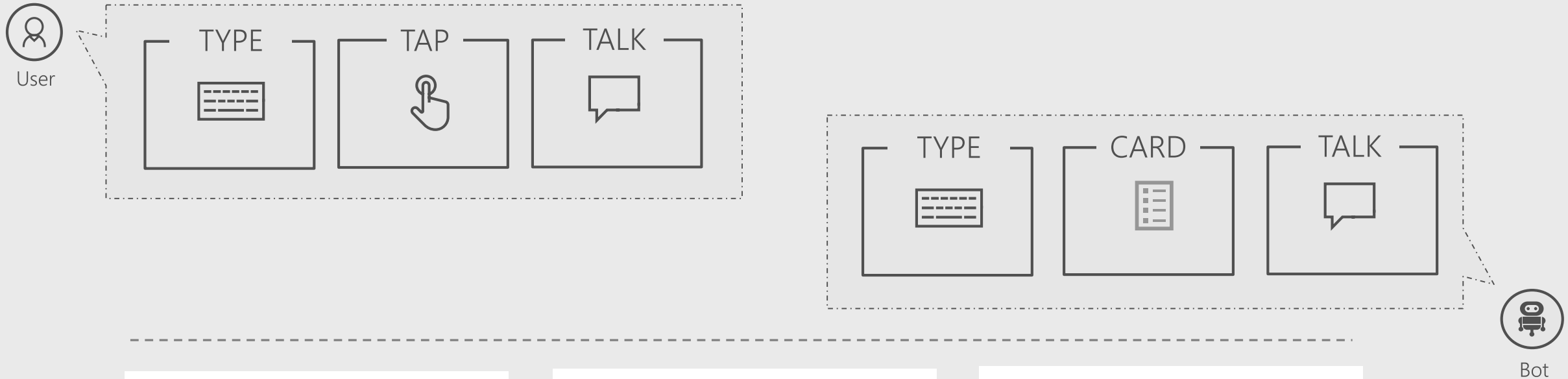


Html Canvas

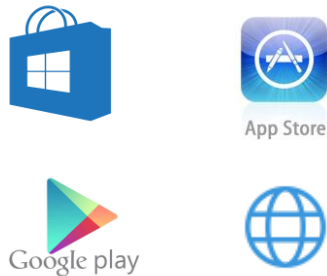
No consistency
No control
Security issues

Modular Code Design

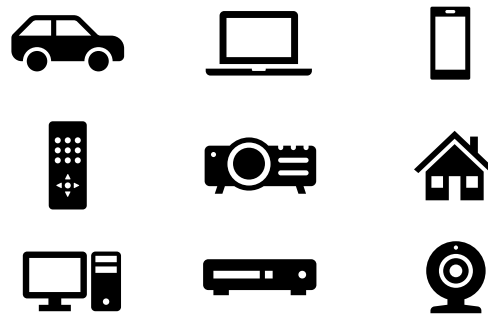
Designing for Bot's Input/ Output



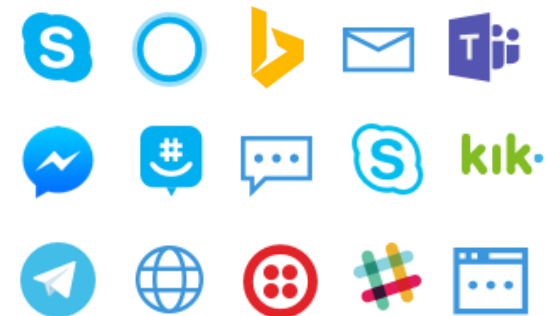
Custom app or website



Custom devices



1st and 3rd Party Channels



Code Design

- Stateless
 - The framework will maintain the conversation stack
 - Serialized and Asynchronous
- Scalable
 - Web Service
- Intelligent
 - Cognitive Services

Dialogs are serialized into stacks

Root Dialog

Login Dialog

Product Search
Dialog

...

This is how we know how to navigate “back”
(Users won’t necessarily think that way)

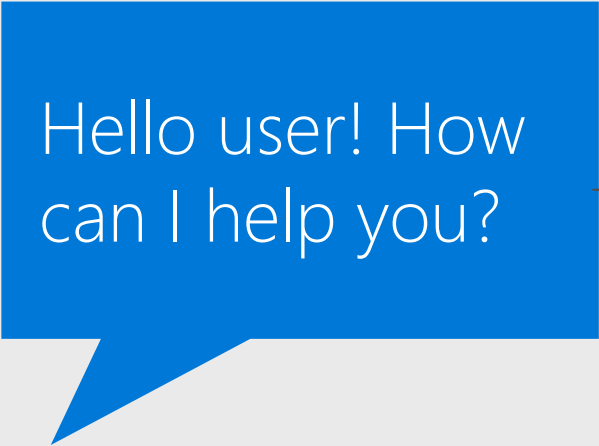
So careful with too much “modality”: Things can get
complex quickly

Like routines and subroutines

Anti-Patterns

Anti-pattern: Overuse of NLP

A bot with a single dialog using 100 LUIS intents is a **bad design**:



Hello user! How
can I help you?

1 question

100 different things your bot can do (intents)

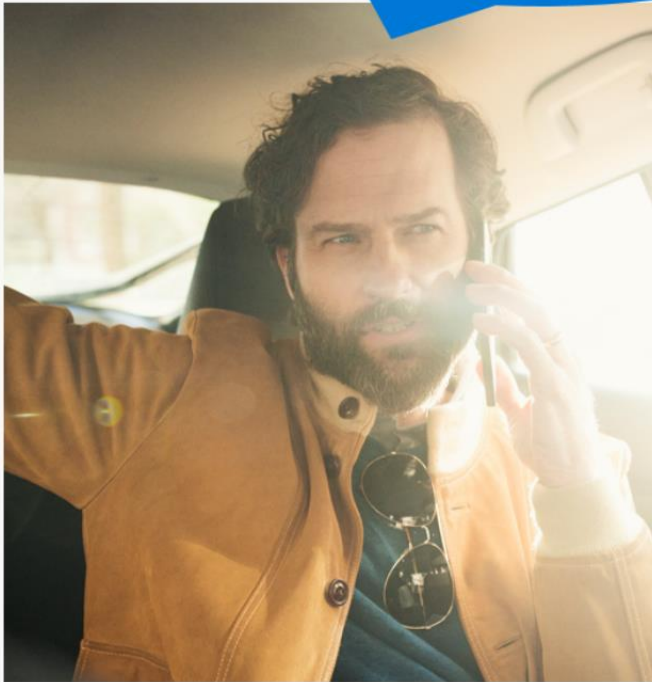
100 different utterances (examples) per intent

= 10,000 different things users may say (plus
the other N possibilities you didn't predict)

Users will only guess 3 or so things from 100

So you might have wasted 97% of your code

Canvas/input mismatch



I need to reset
my password

Ok, human, take note
because I'll only say that
once. Your new
password is:
12}G\$a.;LP0#z[gY6D(k
@G*diP
Goobye



Canvas/input mismatch



Take three steps forward then turn left and shoot the guy in red, quick!!!



Have you ever heard of the Xbox controller? What about buying one?

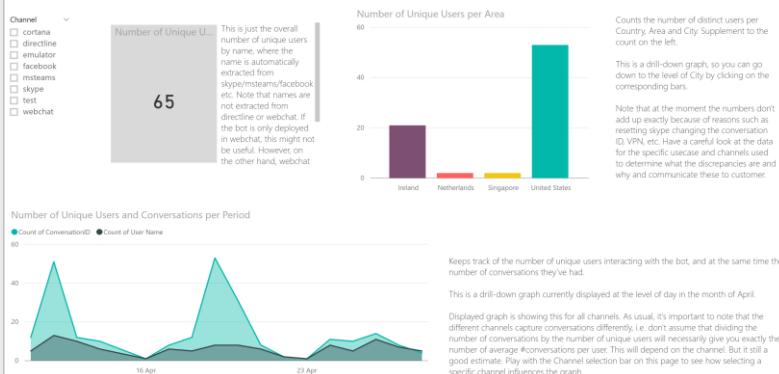
Delivering Bots

Dev Practices

- Scoping
- User Stories
- CI/CD and Versioning
- AI is a Web Service away
- Testing
 - Unit Testing
 - Ava Framework for Node
- Fall back strategy

Bot Telemetry = Business Insights

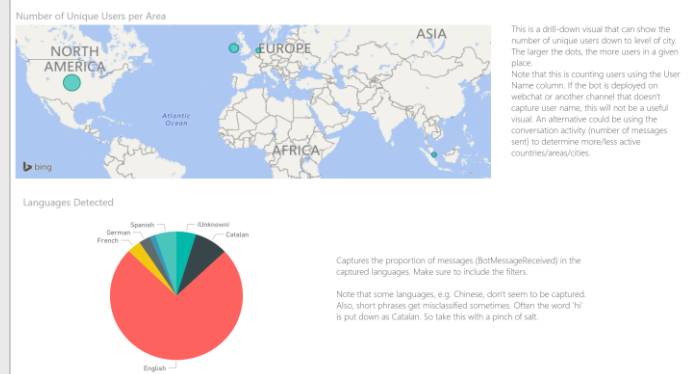
Keeping track of the number of users and conversations per time/location



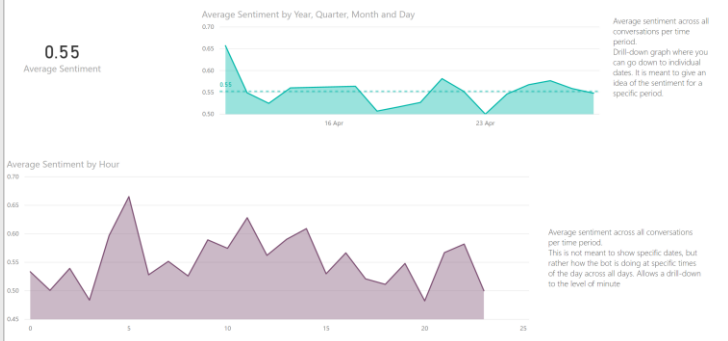
Flow of the conversation Part I - Intents



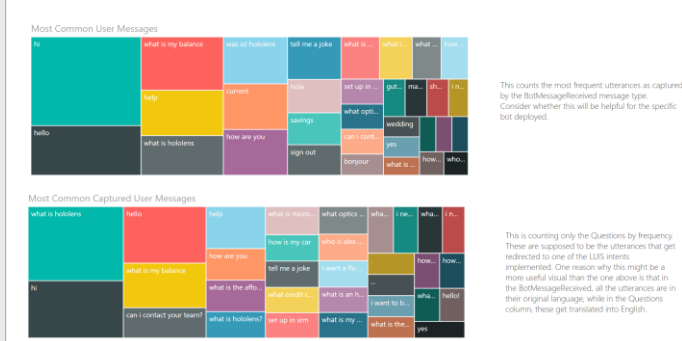
Demographics Visuals



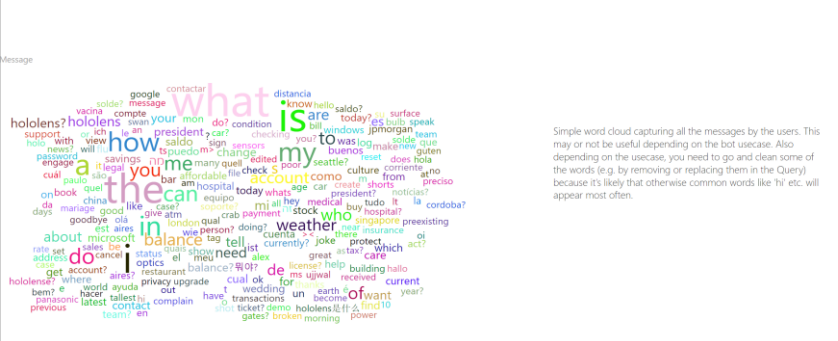
Sentiment of the Conversations



Flow of the Conversation Part II - Most common words, utterances, etc.



Word Cloud



- Understand Bot Usage
- Monitor Bot Performance
- Drive Adoption

Microsoft's Bot Stack

The Microsoft AI platform

AI SERVICES

CONVERSATIONAL AI

Bot Framework

TRAINED SERVICES

Cognitive Services

CUSTOM SERVICES

Azure Machine Learning

AI INFRASTRUCTURE

AI ON DATA

Cosmos
DB

SQL
DB

SQL
DW

Data
Lake

AI COMPUTE

Spark

DSVM

Batch
AI

ACS

Edge

CPU, GPU, FPGA

AI TOOLS

CODING & MANAGEMENT TOOLS

VS Tools for
Machine
Learning

Azure ML
Studio

Azure ML
Workbench

Others (Pycharm, Jupyter notebooks...)

DEEP LEARNING FRAMEWORKS

Cognitive
Toolkit

TensorFlow

Caffe

Others (Scikit-learn, MXNet, Keras, Gluon...)

Bot Framework

Accelerate development

Framework, tools and services to build great bots that converse naturally

Reach any user

Develop once and expose through any channel including Skype, Facebook, web

Enrich the experience

Add advanced capabilities through close integration with Cognitive Services

The screenshot shows the Microsoft Bot Framework developer portal for a bot named 'Liberty Sandwich Bot'. The interface is divided into several sections:

- Navigation:** Includes links for 'My bots', 'Register a bot', 'Documentation', 'Bot Directory', and 'Blog'. A search bar is also present.
- Bot Details:** Displays the bot's name 'Liberty Sandwich Bot' with a subtext 'Liberty's Delightful Sinful Bakery & Cafe'. It includes a 'Publish' button and a notification stating 'You've successfully connected your bot to Skype and Web chat. Click Edit on a channel to fine tune its specific settings.'
- Channels configuration:** A table showing the status of various channels:

Channel	Test link	Status	Published	Action
Skype	Add to Skype	Running (Preview)	On	Edit
Web chat	Chat on the web	Disabled	Off	Edit

Below the table, there is a section 'Add another channel' with options: Direct line, Email Office 365, Facebook Messenger, GroupMe, Slack, and SMS, each with an 'Add' button.
- Analytics:** A section with a lightbulb icon, prompting the user to provide their 'Azure App Insights' key to receive analytics about the bot. A link 'I'll provide the key >' is provided.
- Cognitive Services:** A section with a brain icon, explaining that 'Cognitive Services' enable bots to see, hear, interpret, and interact in more intelligent ways.
- Chat:** A section titled 'Chat with this bot now via web channel' showing a chat interface. The bot's greeting is: 'Hi! I'm Liberty Sandwich Bot. I help you with your order and answer questions about our menu items.' Below this, there is a link to 'LibertySandwich.vcf' and a prompt 'What can I help you with?'. The chat is identified as 'LibertySandwichBot - Now'.

What is the Bot Framework?

What?

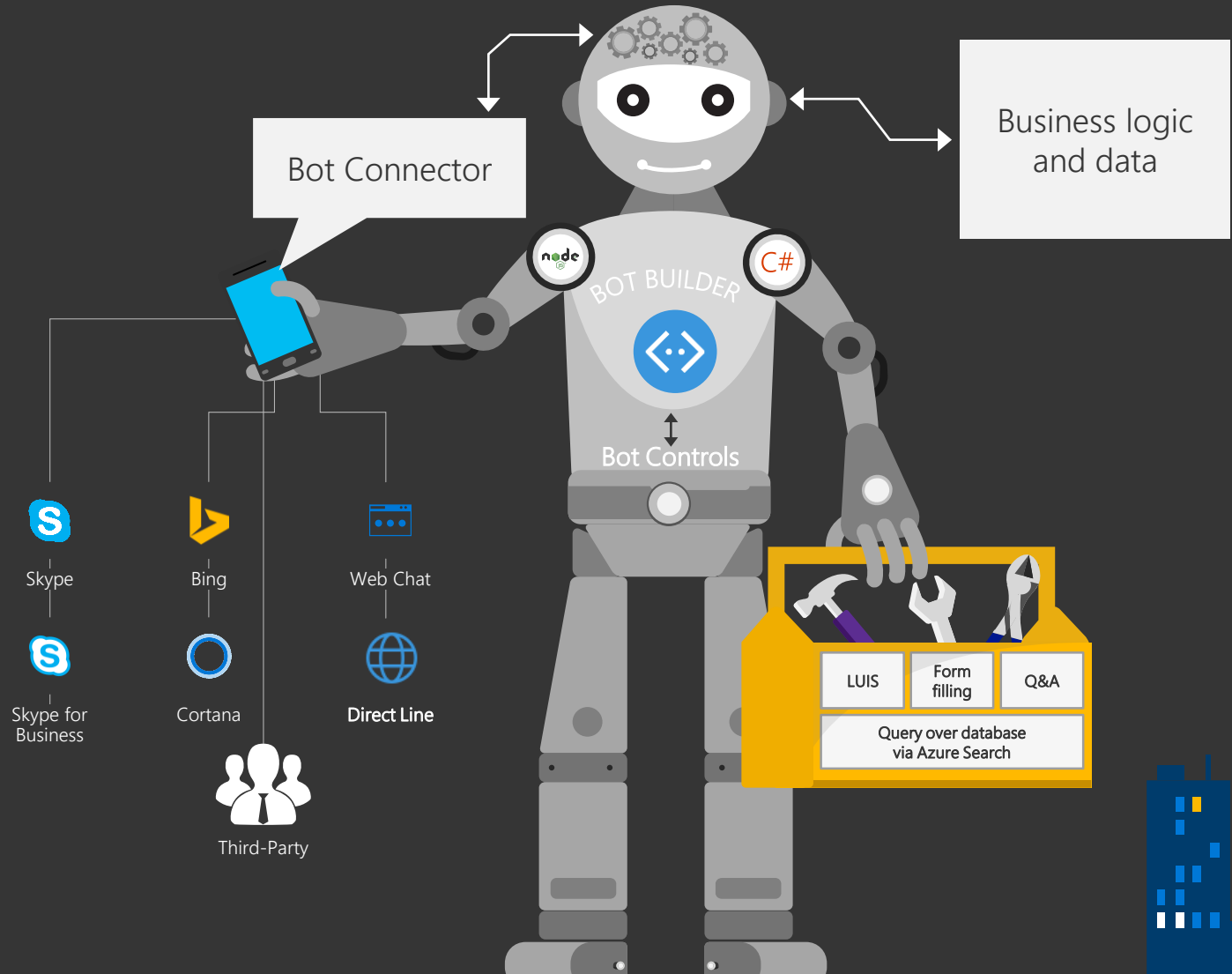
- Channels
- Hosting services
- Tools

Why?

- Implements standard protocols
- Modeling conversations is hard
- UI across multiple canvases is hard
- Language understanding is hard
- Common and well understood patterns


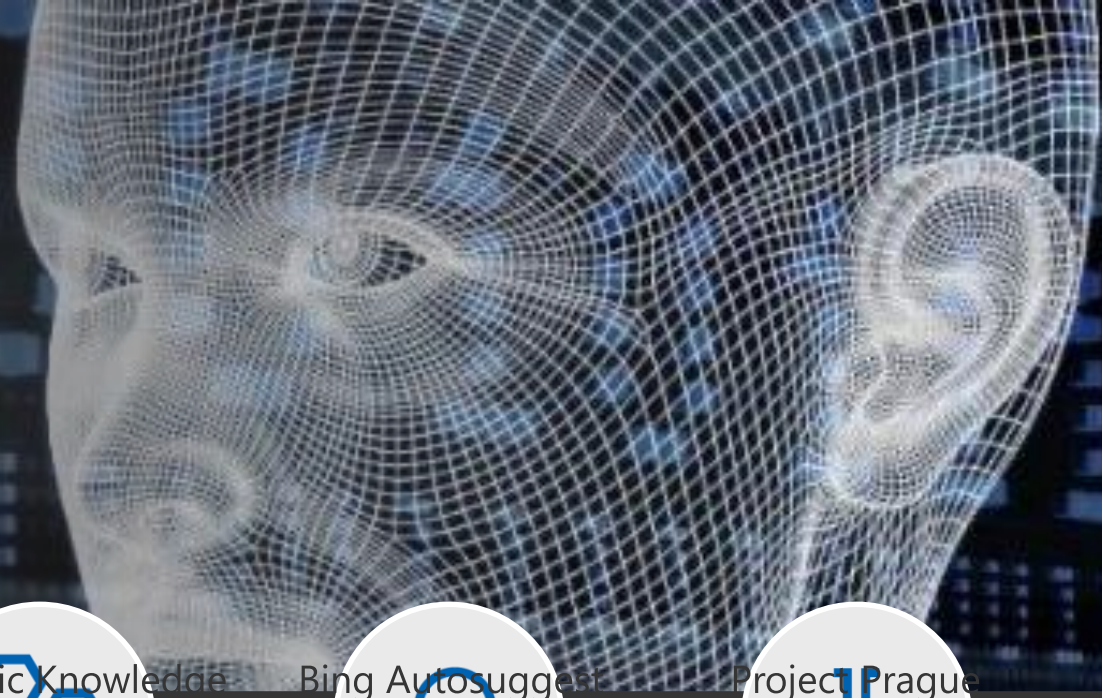
Goals

- Start simple. Add complexity. No dead-ends.
- Bot adapts to the user, based on context
- Composable and intelligent controls to manage complexity



Microsoft Cognitive Services

Give your apps a human side



Computer Vision
Content Moderator
Emotion
Face
Vision
Video Indexer
Custom Vision Service



Bing Speech
Speaker
Recognition
Custom Speech
Speech



Bing Spell Checker
Linguistic Analysis
Text Analytics
Translator Text
& Speech
Language
Web Language
Model
Language
Understanding



Academic Knowledge
Entity Linking
Knowledge
Exploration
Recommendations
Knowledge
QnA Maker
Custom Decision
Service



Bing Autosuggest
Bing Image Search
Bing News Search
Bing Video Search
Search
Bing Web Search
Bing Entity Search
Bing Custom
Search



Project Prague
(gesture)
Project Cuzco (events)
Project Johannesburg
(rhythms)
Labs
Project Nanjing
(isochrones)
Project Abu Dhabi
(distance matrix)
Project Wollongong
(location)

User Experience

- Designing bots leverages your existing design skills
- Scenarios
 - Focus on scenarios that increase productivity, mobile, short interactions
- Navigation
 - Changes conversation topic, promotes wayfinding
- Conversation Flow
 - Structures conversation to complete a user story
- Conversation UI
 - Dialogue to guide the conversation with clear, concise copy, understanding

Beyond the Architecture

- Solving real *business problems* is key
- Good *bot design* and *user experience* are critical to success
 - Bot *personality* brings your brand to life and is the voice of your company to the consumer
 - User experience - *usability* drives adoption
- Bots should *do more* than answer questions – they should also *complete tasks* on the users behalf
- *Telemetry = Business Insights*

Parting Words of Wisdom

- Humans are complex
- Humans are random
- Humans are illogical
- But that makes it more fun!

Parting Words of Wisdom

- Early days (in every dimension)
 - NLP
 - Speech
 - Conversation Logic
 - Channels
 - Users
- You get to define what your bot is
- Have fun!



Q/A

Meet Bots, the new apps



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