

Natural Language Understanding Services for Chatbots

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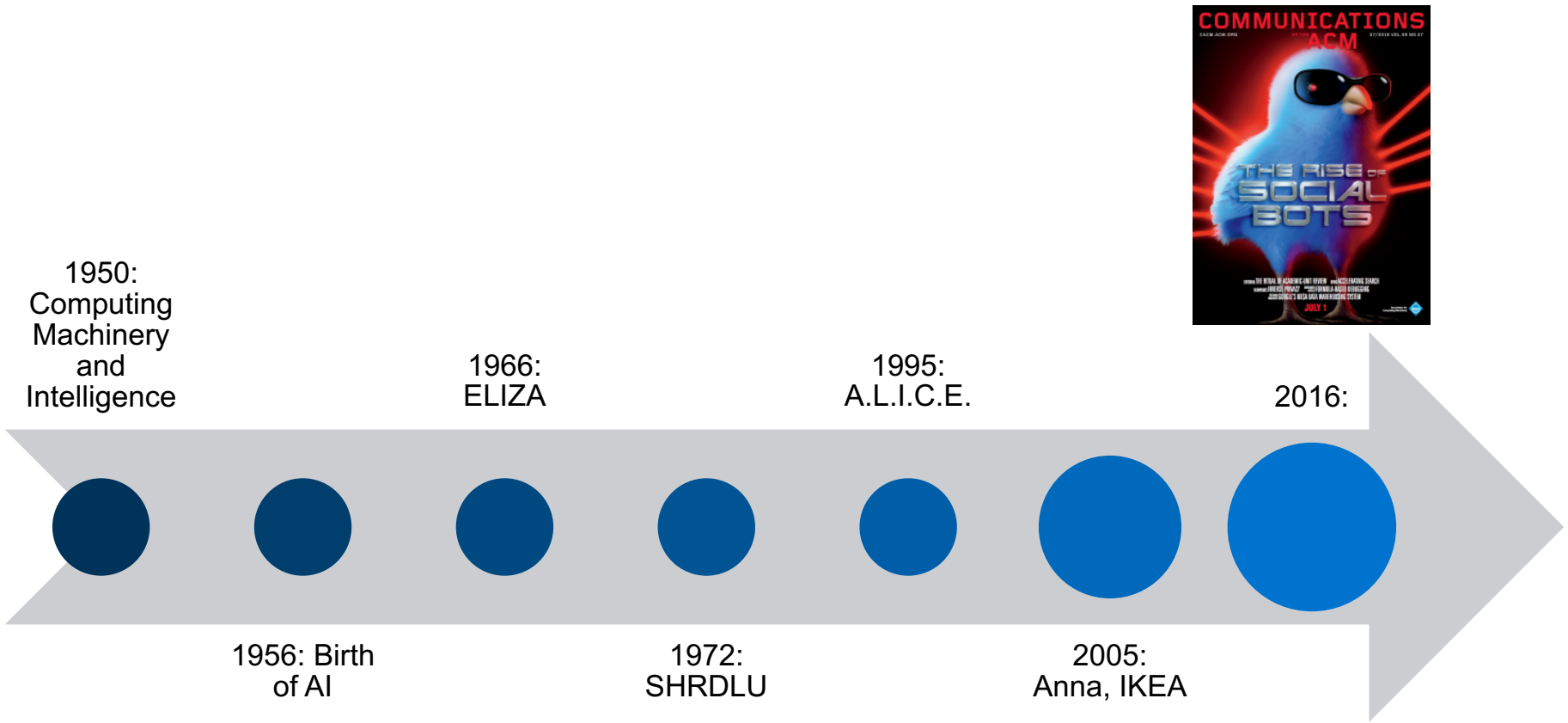
Outline



- A brief History of Chatbots
- General Architecture
- Natural Language Understanding as a Service
- Possible Applications

A brief History of Chatbots

Timeline



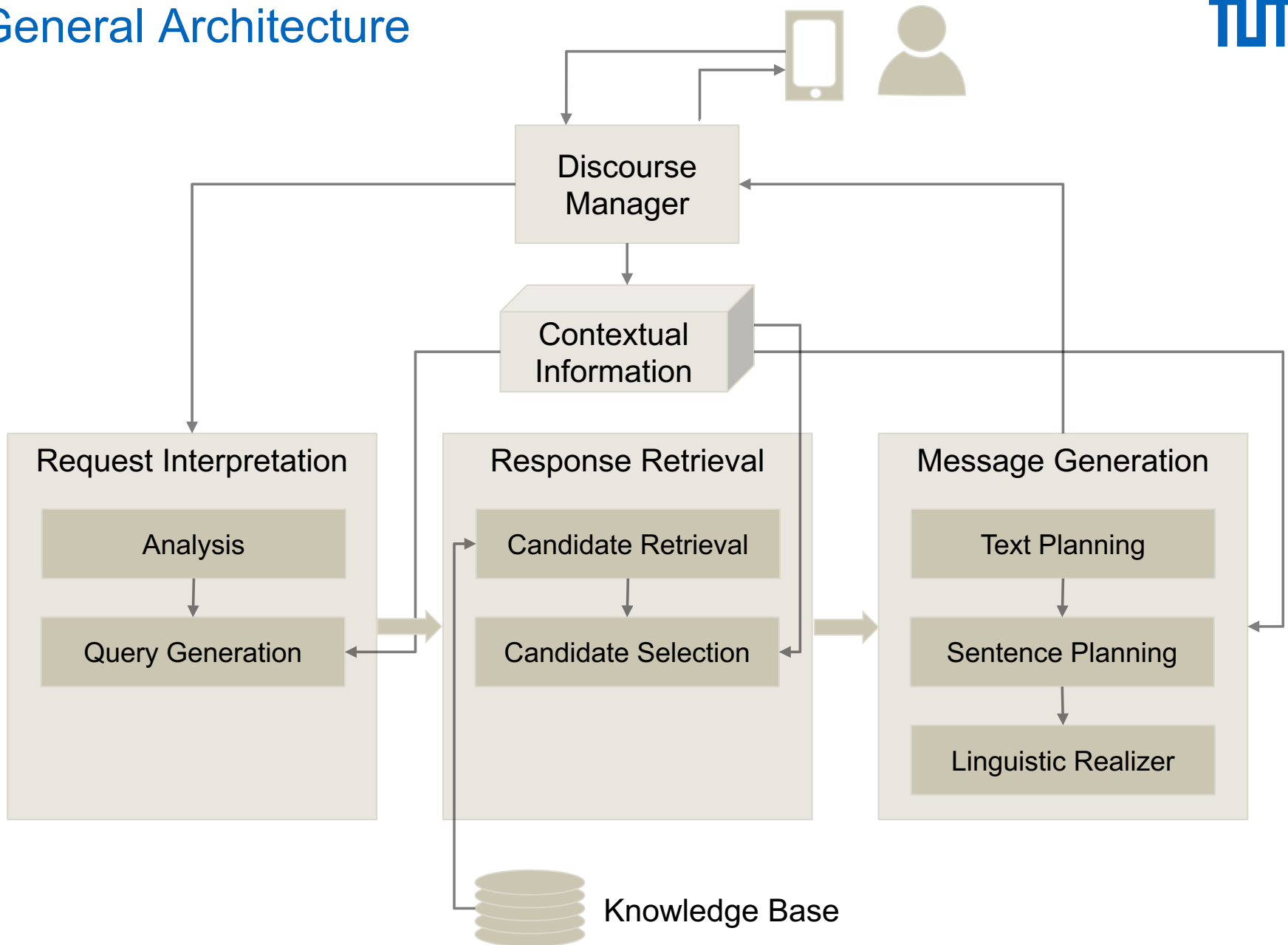
A brief History of Chatbots

What has changed?

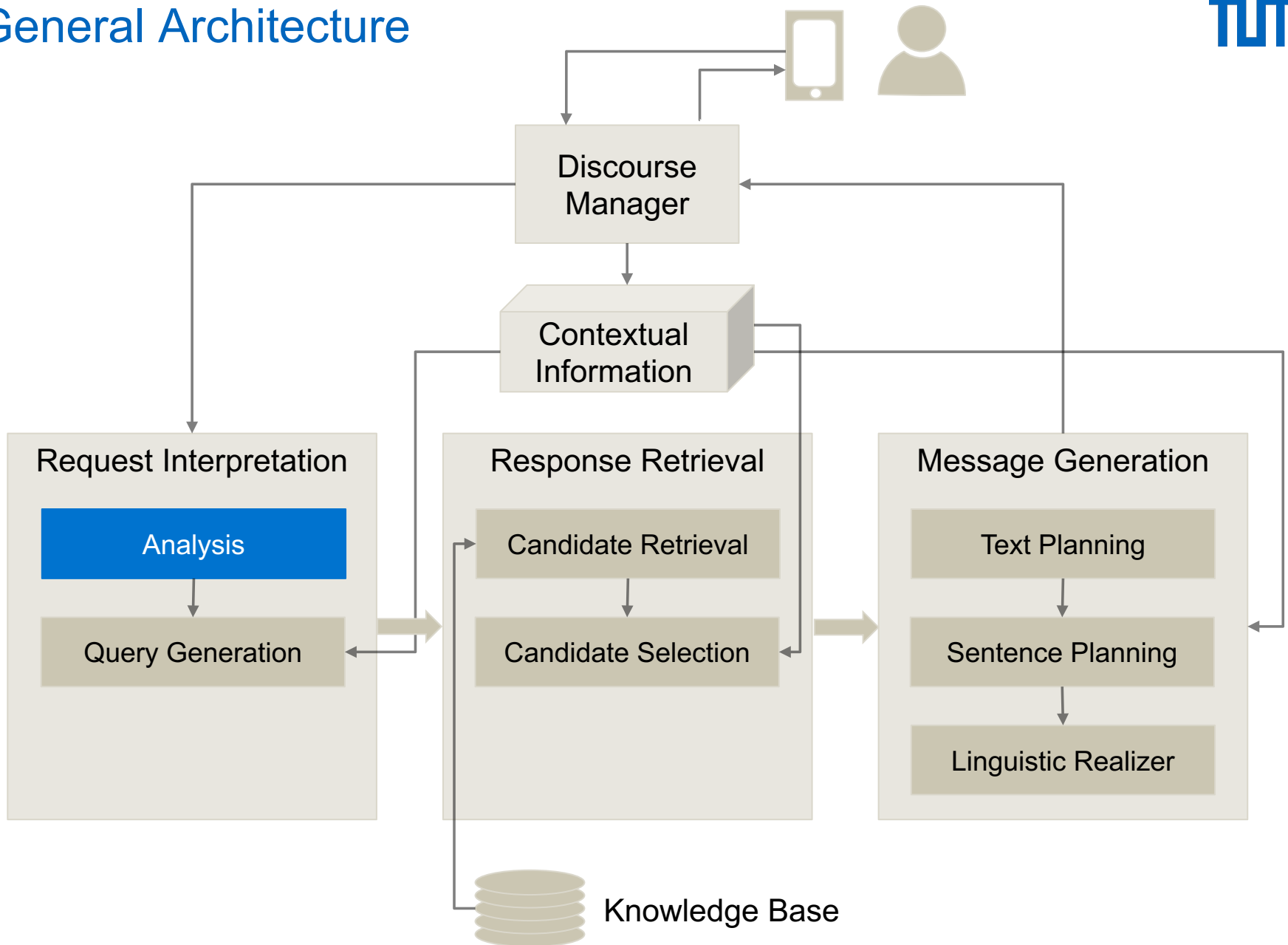


- Universal messenger platforms (Facebook, Telegram, ...)
- Advances in machine learning
- Artificial intelligence as a service

General Architecture



General Architecture



Natural Language Understanding as a Service

Training



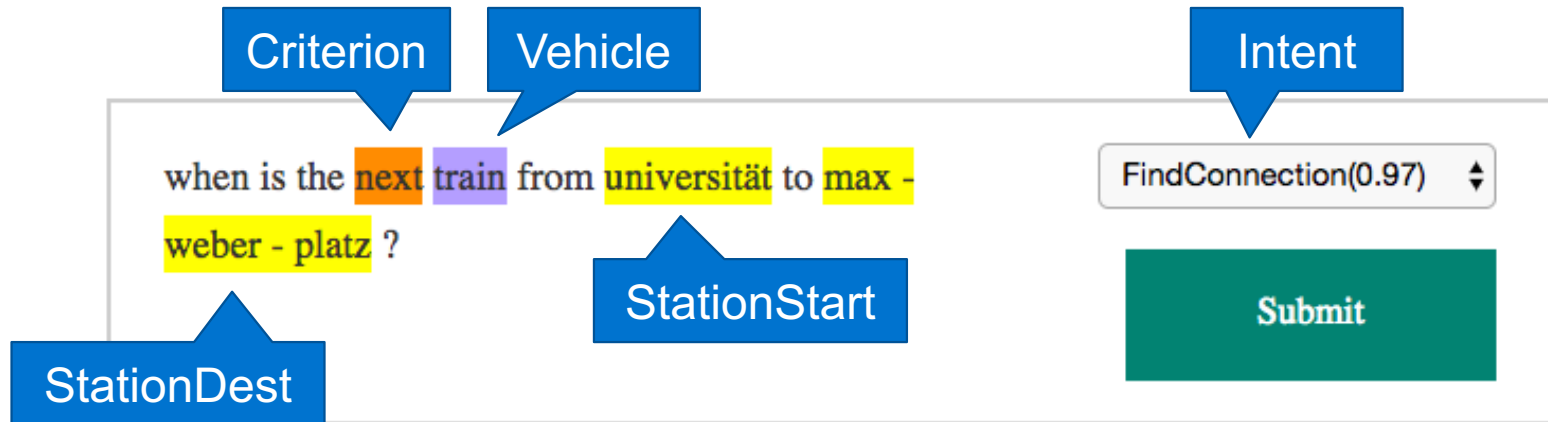
when is the next train from universität to max -
weber - platz ?

FindConnection(0.97) ⚡

Submit

Natural Language Understanding as a Service

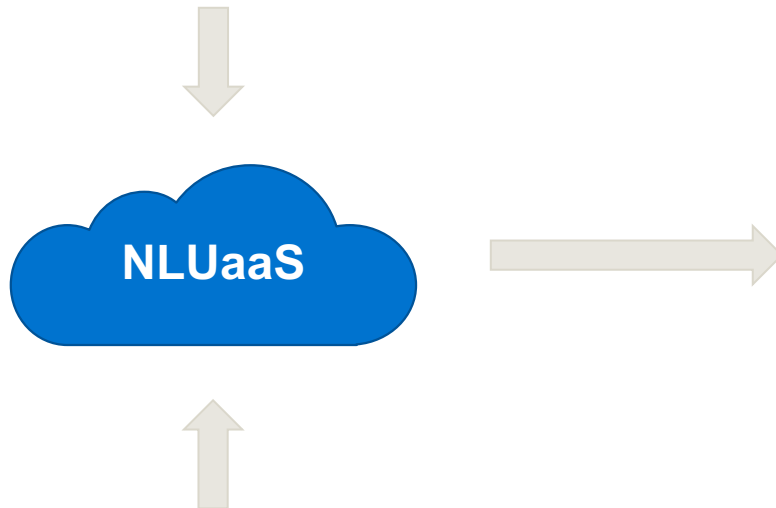
Training



Natural Language Understanding as a Service

Usage

D Daniel ✓✓ 13:39
How can I get from Garching to Odeonsplatz?



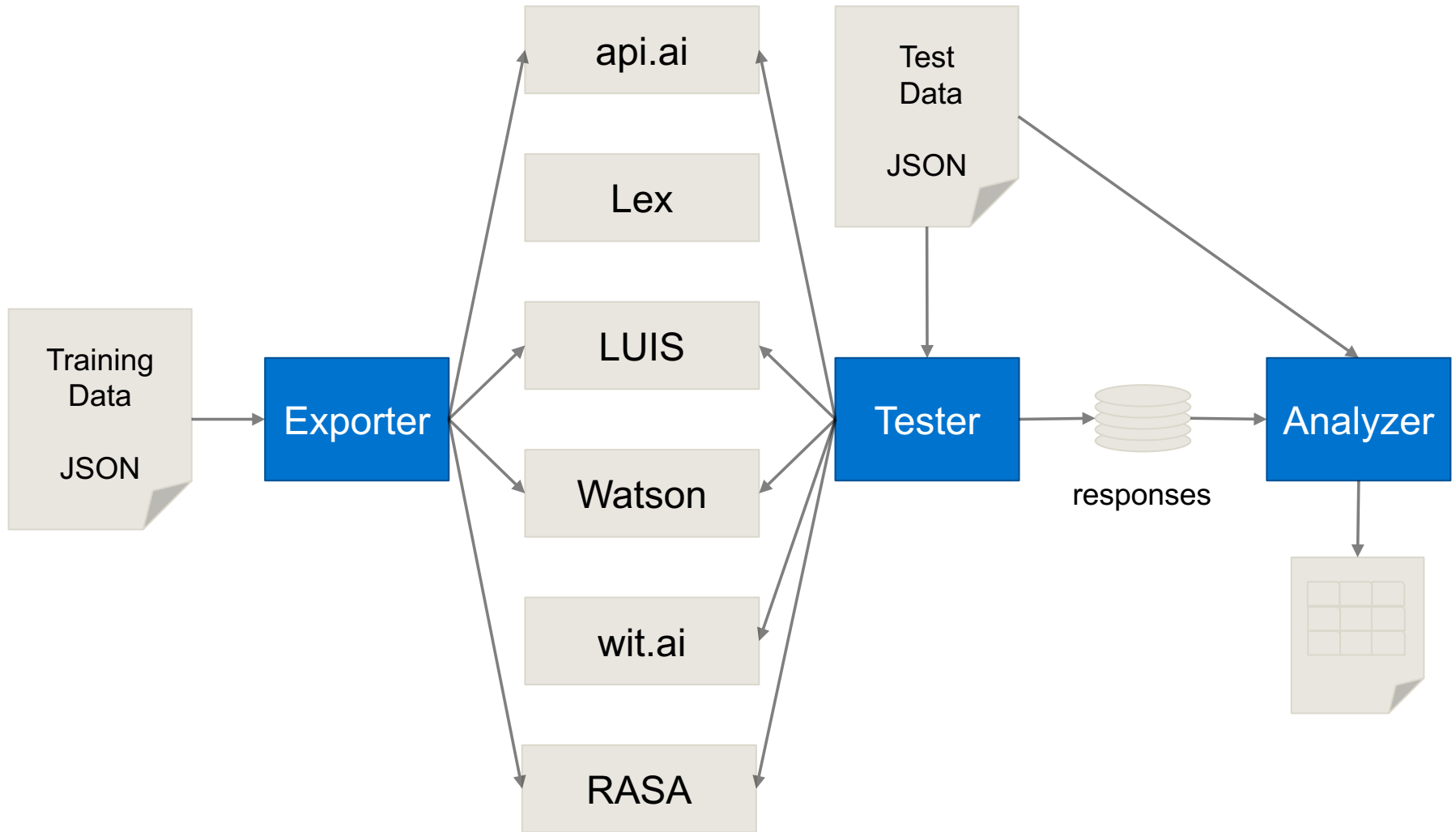
```
{  
  "Intent": {  
    "score": 0.9675428,  
    "intent": "FindConnection"  
  },  
  "entities": [  
    {  
      "type": "StationStart",  
      "entity": "garching",  
      "score": 0.912249  
    },  
    {  
      "type": "StationDest",  
      "entity": "odeonsplatz",  
      "score": 0.945334  
    }  
  ]  
}
```

D Daniel ✓✓ 15:32
Can you find a connection to Odeonsplatz starting at Garching?

- **api.ai (Google)**
- Lex (Amazon, closed beta)
- **LUIS (Microsoft)**
- **Watson Conversation (IBM)**
- wit.ai (Facebook)
- **RASA (open source)**

Natural Language Understanding as a Service

Evaluation

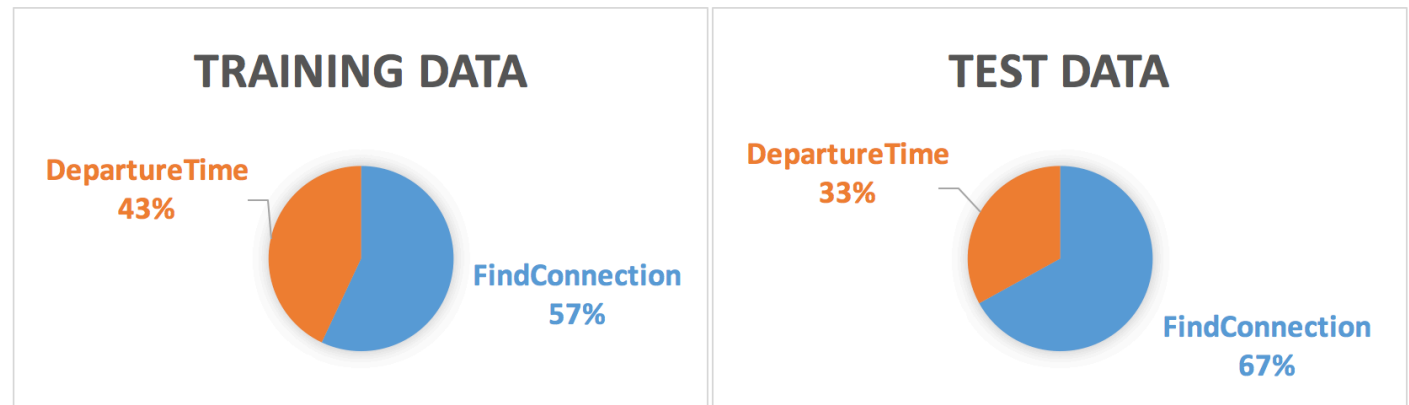


Natural Language Understanding as a Service

Data Corpus

- 206 manually labelled questions (100 training, 106 test)
- domain: public transport in Munich
- language: English + German station names
- 2 intents, 5 entity types

	Training data	Test data
StationStart	91	102
StationDest	57	71
Criterion	48	34
Vehicle	50	35
Line	4	2



Evaluation Results

Entity type / Intent	Type	True positive	False negative	False positive	Precision	Recall
DepartureTime	Intent	34	1	1	0,971	0,971
FindConnection	Intent	70	1	1	0,986	0,986
Criterion	Entity	34	0	0	1	1
Line	Entity	0	2	0	0	0
StationDest	Entity	65	6	3	0,956	0,915
StationStart	Entity	90	17	5	0,947	0,841
Vehicle	Entity	33	2	0	1	0,943
		326	29	10	0,970	0,918

Entity type / Intent	Type	True positive	False negative	False positive	Precision	Recall
DepartureTime	Intent	33	2	1	0,971	0,943
FindConnection	Intent	70	1	2	0,972	0,986
Criterion	Entity	34	0	0	1	1
Line	Entity	1	1	0	0	0,5
StationDest	Entity	42	29	75	0,359	0,592
StationStart	Entity	65	37	50	0,565	0,637
Vehicle	Entity	35	0	0	1	1
		280	70	128	0,686	0,8

Entity type / Intent	Type	True positive	False negative	False positive	Precision	Recall
DepartureTime	Intent	35	0	4	0,897	1
FindConnection	Intent	60	11	0	1	0,845
Criterion	Entity	31	3	0	1	0,912
Line	Entity	1	1	0	0	0,5
StationDest	Entity	0	71	0	0	0
StationStart	Entity	28	79	4	0,875	0,262
Vehicle	Entity	34	1	5	0,872	0,971
		189	166	13	0,936	0,532

LUIS

- F-Score: 0.943
- No “Line” detected
- Overall good
- Same result as RASA

Watson Conversation

- F-Score: 0.739
- Many stations labelled twice (start and dest)
- Highest number of false positives

Api.ai

- F-Score: 0.678
- No “StationDest” detected
- Highest number of false negatives

More extensive Evaluation with:

- more domains
- more representative data (StackExchange)
- more data (MT labelling)
- pre-defined entity types

Task: Backup user dictionaries in WinCC

Uninstalling user dictionaries

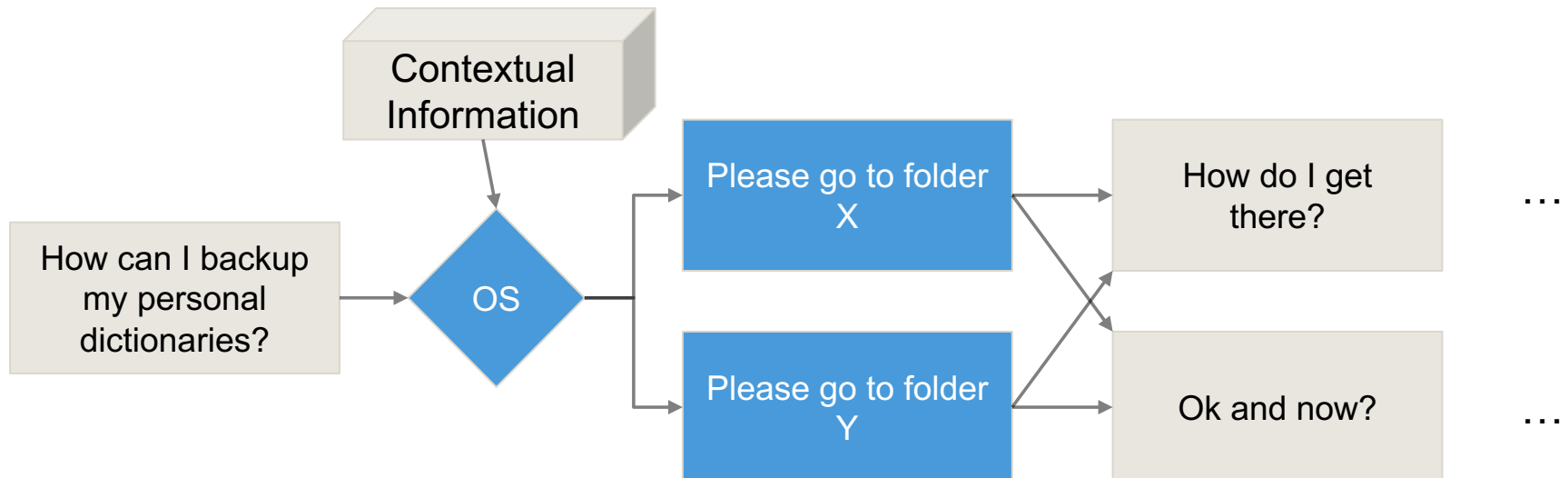
The uninstall routine also deletes the user dictionaries. You should create a backup copy of the dictionaries to save these for further use.

1. Search for the "UserDictionary.dct" file in the "C:\Documents and Settings\All Users\Application Data\Siemens AG\WinCC flexible" folder.
2. Copy the "UserDictionary.dct" and "UserDictionary_log.LDF" files.

Note

The following storage location is used in Windows Vista:

"C:\ProgramData\Siemens AG\WinCC flexible"





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