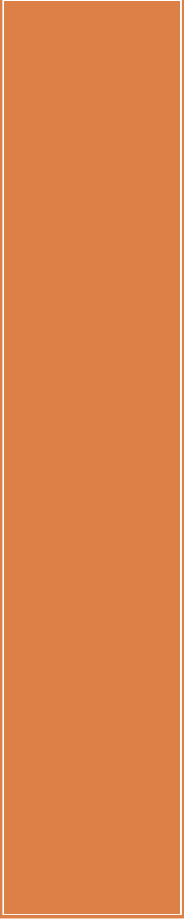


Developing A Cognitive Assistant For Audit Plan Brainstorming Sessions

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- 
- Introduction
 - Research Problem
 - Proposed Solution - Framework
 - Experiment and Demo
 - Limitation and Future

Audit Plan Brainstorming Session:

Mandated in two auditing standards: SAS No. 99 and SAS No. 109

Purpose: Discuss the susceptibility of the entity's financial statements to material misstatement due to fraud (*Landis 2008, Hammersley et al. 2010, Beasley and Jenkins 2003*)

Common procedure: Checklist in open-ended form

Importance:

- ☐ Generate more high-quality ideas on fraud risks as a team (*Hammersley et al. 2010, Carpenter 2007*)
- ☐ Affect auditors' subsequent performance of audit

Current Issues:

- Limitations with Checklist
- Ineffective new ideas generation
- Uncollected experience and expertise
- Unreached additional external information

Audit Cognitive Assistant



What we can do??

Cognitive Assistant (Intelligent Personal Assistant)

Interact with users with speech-enabled technologies

Provide assistance by answering questions, making recommendations, and performing actions (*Canbek and Mutlu 2016, Hauswald et al. 2015, Myers et al. 2007, Garrido et al. 2010, Chen, 2015*)

Commercial personal assistants (*Mehrez, 2013*): Apple Siri, Google Now, Microsoft's Cortana. Amazon's Echo/Alexa IBM Watson



Advantages Of Cognitive Assistant In Audit Decision Plan Brainstorming:

□ Technically feasible

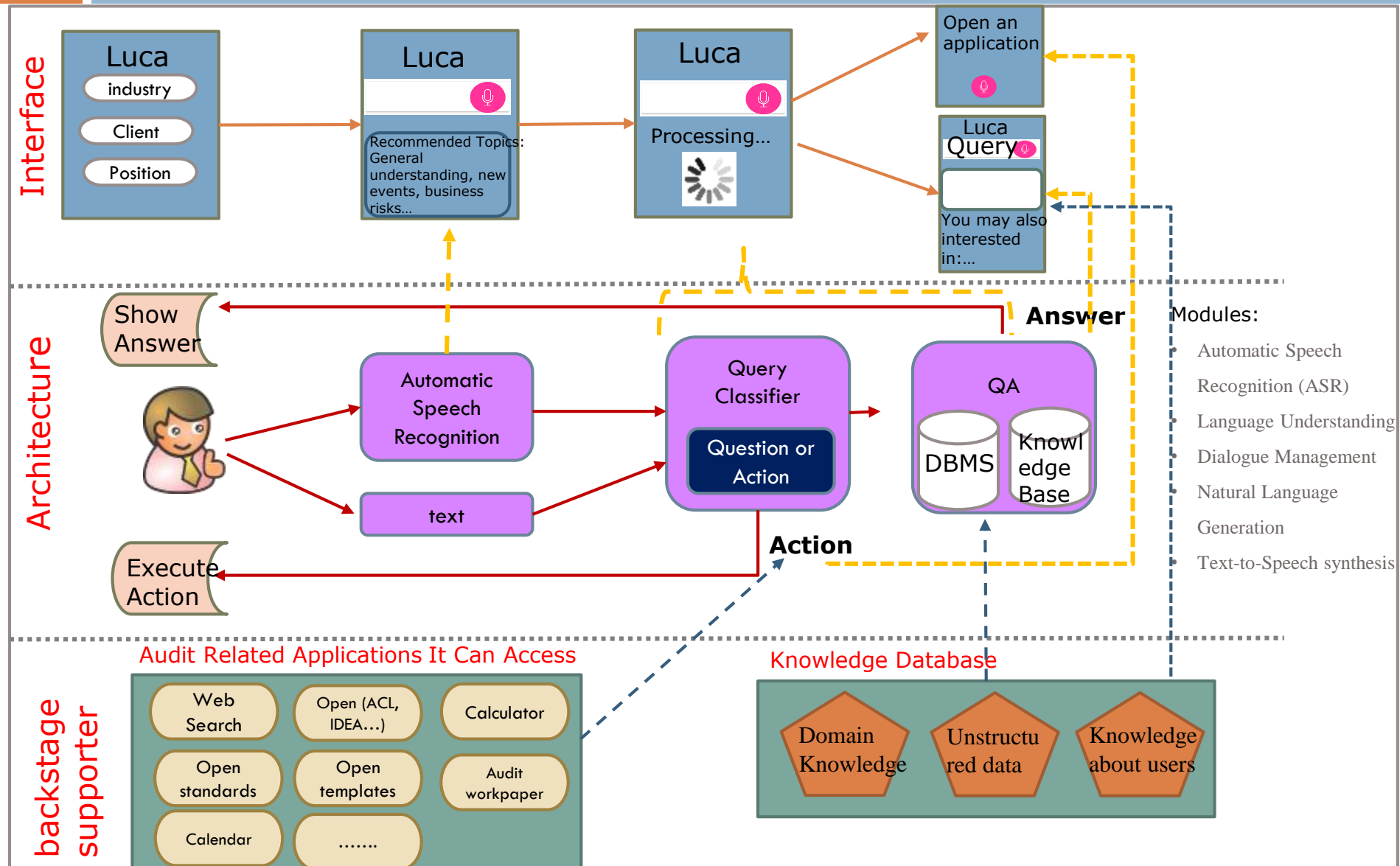
- Advanced AI technologies
- Big data support

□ Solution to a success of brainstorming meeting

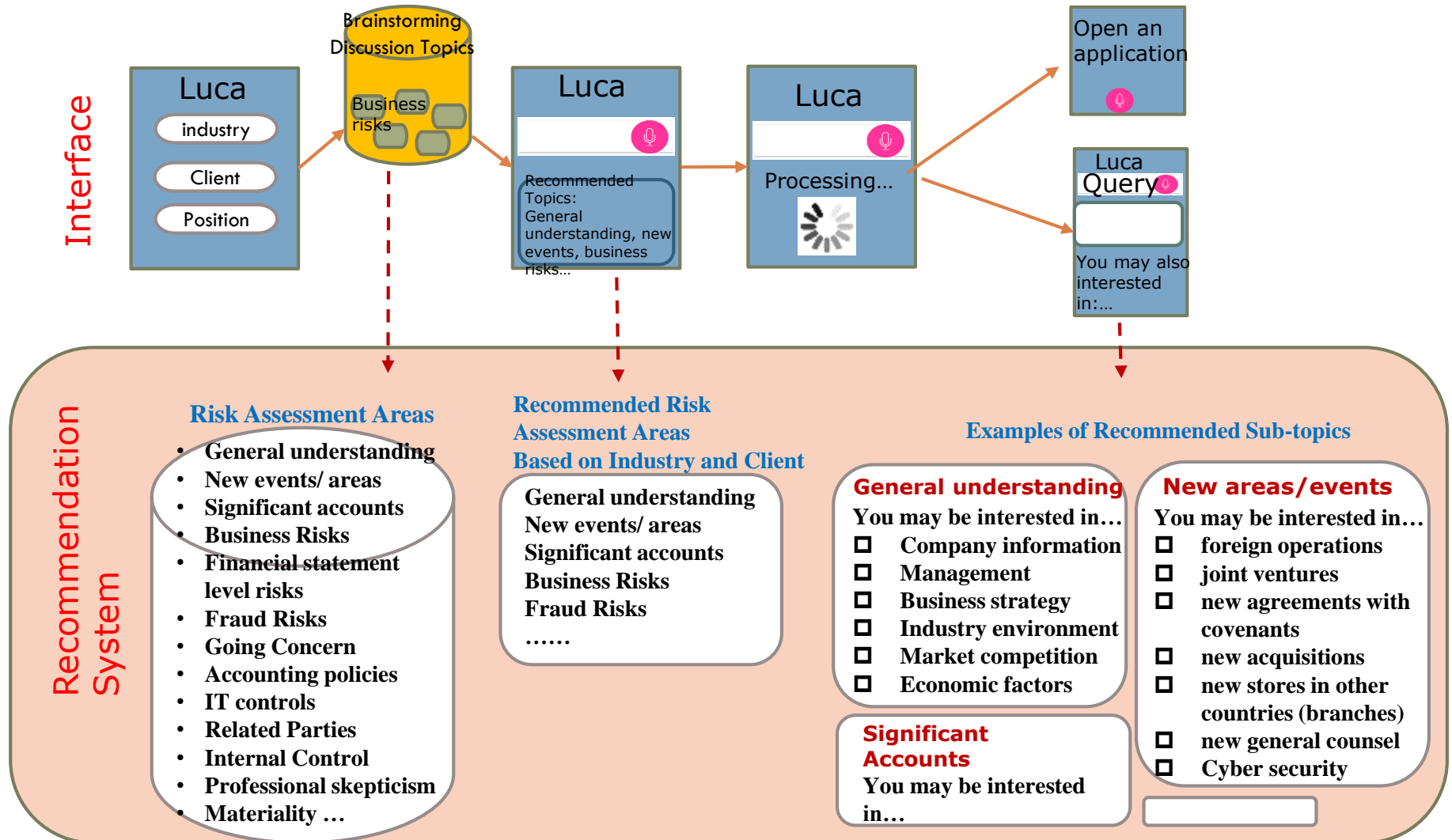
- Knowledge collection and organization (**Knowledge Base**)
- Audit information retrieval and decision making support (**Cognitive Computing**) (*IBM 2016*)
- Recommendation on discussion procedure and topics (**Adaptive Learning**) (*Myers et al., 2007*)
- Audit applications / program connection (**Invoking Apps**) (*Canbek and Mutlu 2016, Ebling 2016*)
- Quick interactions with auditors (**Spoken Dialogue System**)

Proposed Method: Architecture of the Proposed Audit Cognitive Assistant

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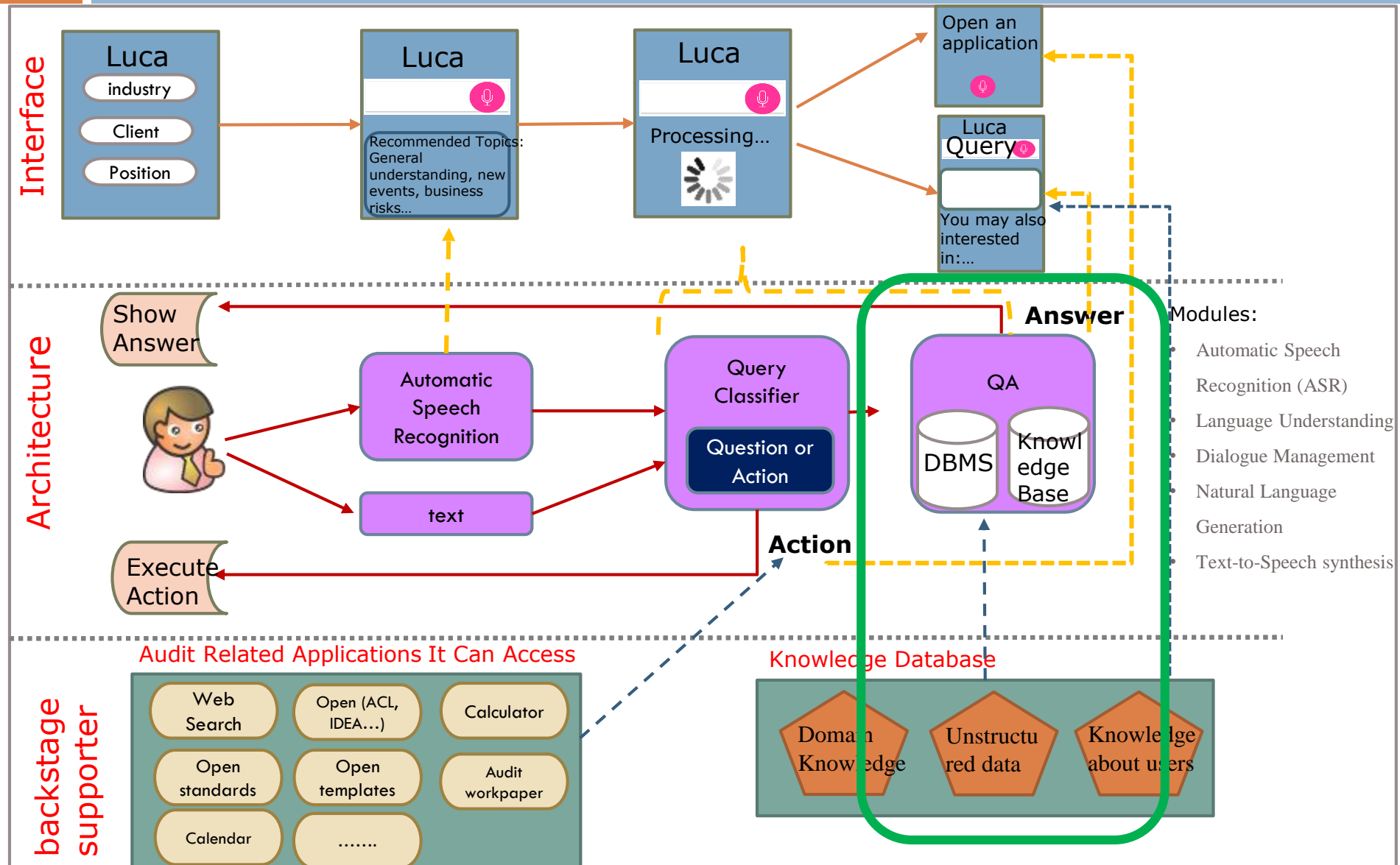


Recommender System of the Proposed Cognitive Assistant

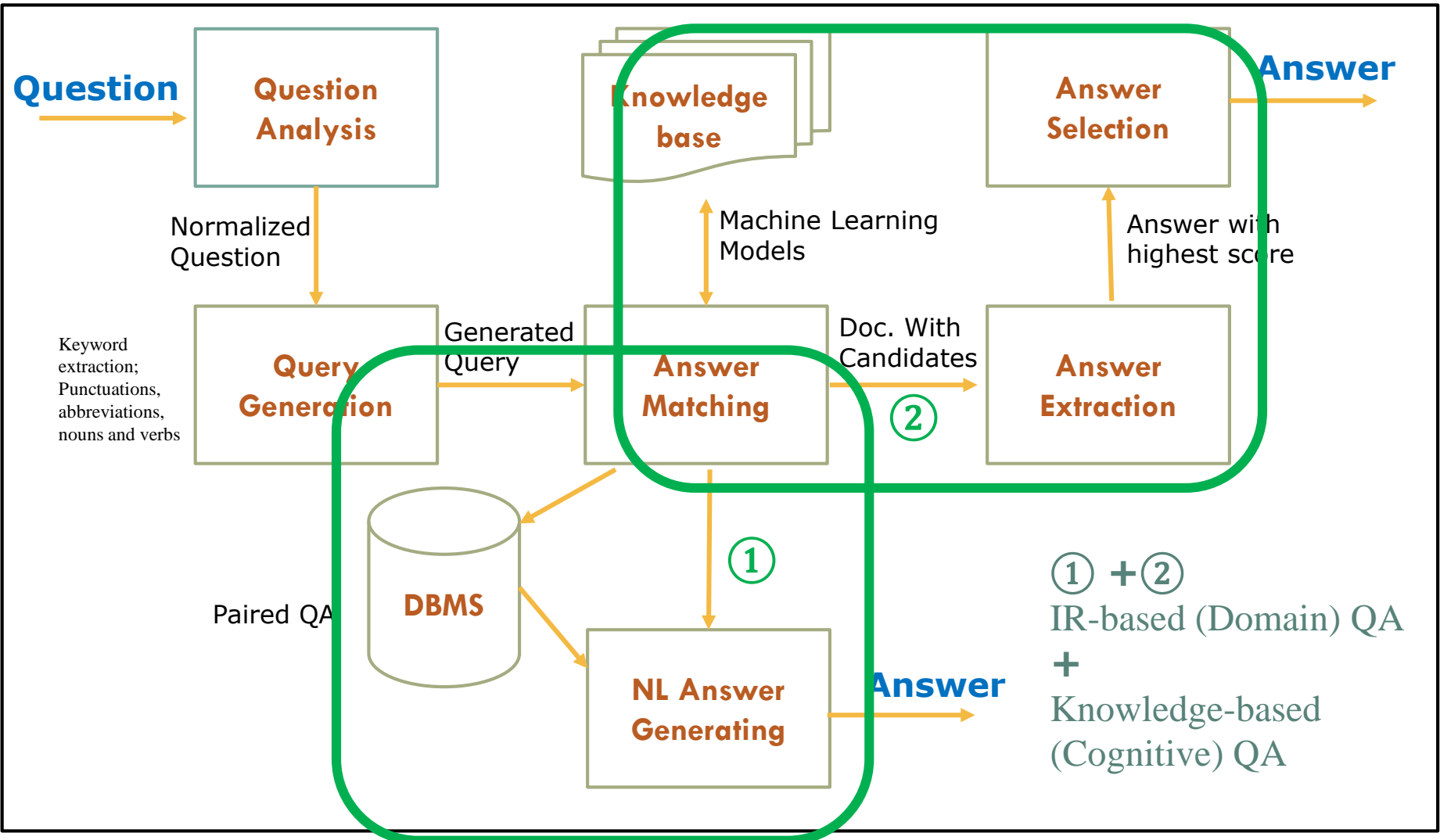


Architecture of the Proposed Audit Cognitive Assistant

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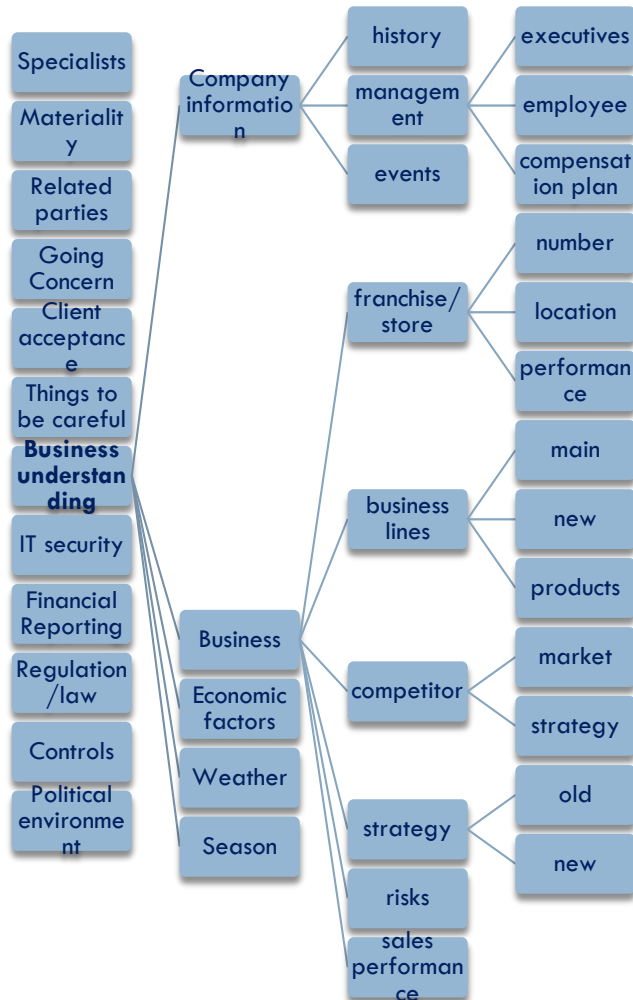


Question Answering System of the Proposed Cognitive Assistant



Question Answering System of the Proposed Cognitive Assistant

Proposed Questions and Answers Categories



Example: IT security

Q	A
Do they have any security issue before?	Customer's credit card information leakage issue
What IT controls do they have?	New head of IT, control over POS systems in the stores; control from store POS system to servers at IT center

Experiment Objective:

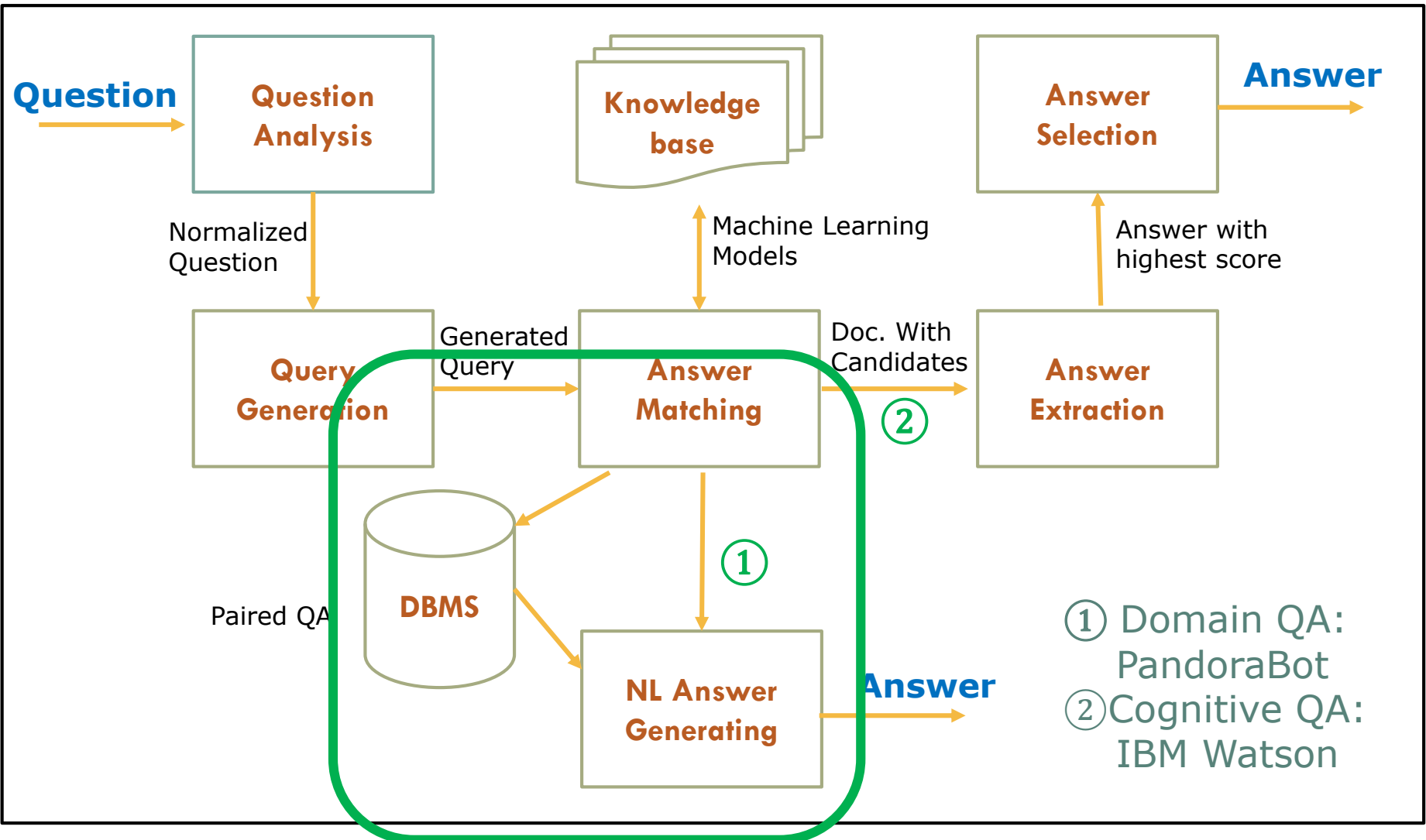
- Develop knowledge base for the proposed cognitive assistant

System supporting data:

- Recordings of four typical brainstorming discussions conducted in a big audit firm
- Additional cases can be integrated into the system

	(Brian H. manager)
53	And you mentioned that they're still trying to figure out the right strategy there
54	the document also talks about a new strategy
55	and transforming the business
56	and I think they are trying to go from maybe a perception of a little bit more upscale,
57	to more of the bar and grill.
	(Brian F.Partner)
58	It is interesting
59	because when they started they were clearly a bar and grill restaurant

Question Answering System of the Proposed Cognitive Assistant



- Testing input: question asked by user
- Testing output: generated answer

Sample Q	A
what is the number of stores and franchise	700 stores: 650 company-owned franchise and 50 franchises
what are the main businesses	Main businesses include bar and grill, and Mexican restaurants.

Using developed QA pairs to build Domain QA part:

- Examples from Pandorabot (written with AIML):

Human:

what are the core products

Ask

Human: what are the core products

Matched: what are the core products (category defined in [test.aiml](#))

qiao: beers and burgers

Human:

any identified store level risk

Ask

Human: any identified store level risk

Matched: any identified store level risk (category defined in [test.aiml](#))

qiao: 1. a lot of temporary employees 2. high employee turnover rate (less motivation to work), this may lead to information security issue

- Limitation
 - Need large number of brainstorming meeting cases

- Continue Work
 - Develop industry based recommendation system
 - Develop audit knowledge QA system
 - Design an “Audit Watson” for predictive audit risk assessment: case of medical industry

Thank You !

