New Frontiers in IA

Design in the Era of Cognitive Computing


Imagine if you had the power to continuously gather, understand, and use all the data in the world.
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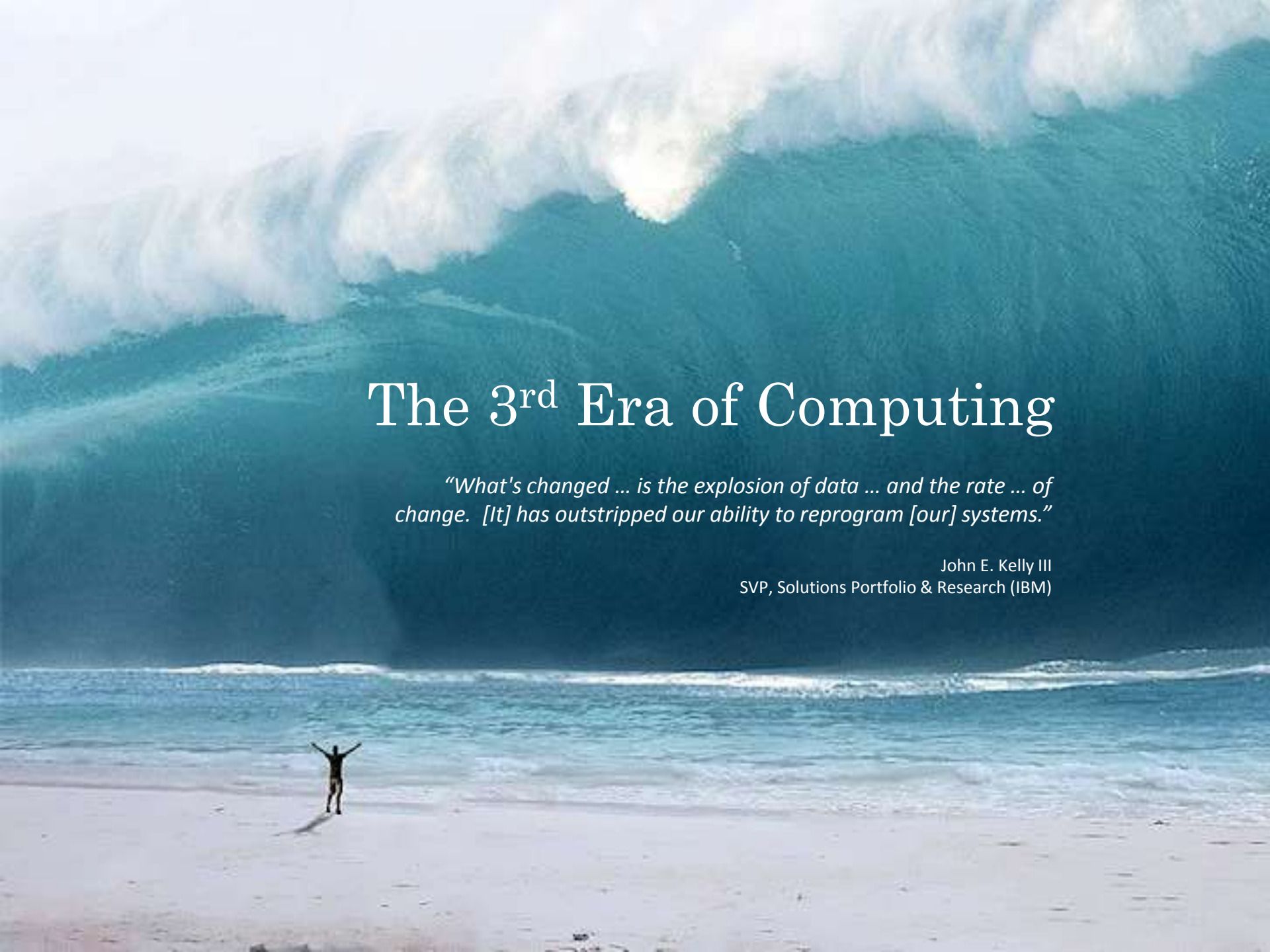
Could we help people work and play better?



The 3rd Era of Computing

"What's changed … is the explosion of data … and the rate … of change. [It] has outstripped our ability to reprogram [our] systems."

John E. Kelly III
SVP, Solutions Portfolio & Research (IBM)

Sense

Sense with networked devices

Big (global) data

Data is unstructured, changes frequently, and is often conflicting

Learn

Learn and adapt

Model knowledge

Iterative and Stateful

Remember previous interactions and use prior information

Think

Generate and evaluate hypotheses

Synthesize influences, contexts, insights, ambiguous situations

Engage

Natural interaction

Curious

Evolving “personalities”

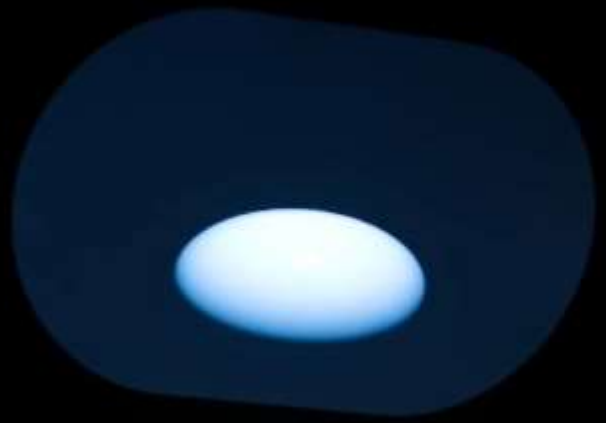
Help define problems by asking questions and finding other inputs

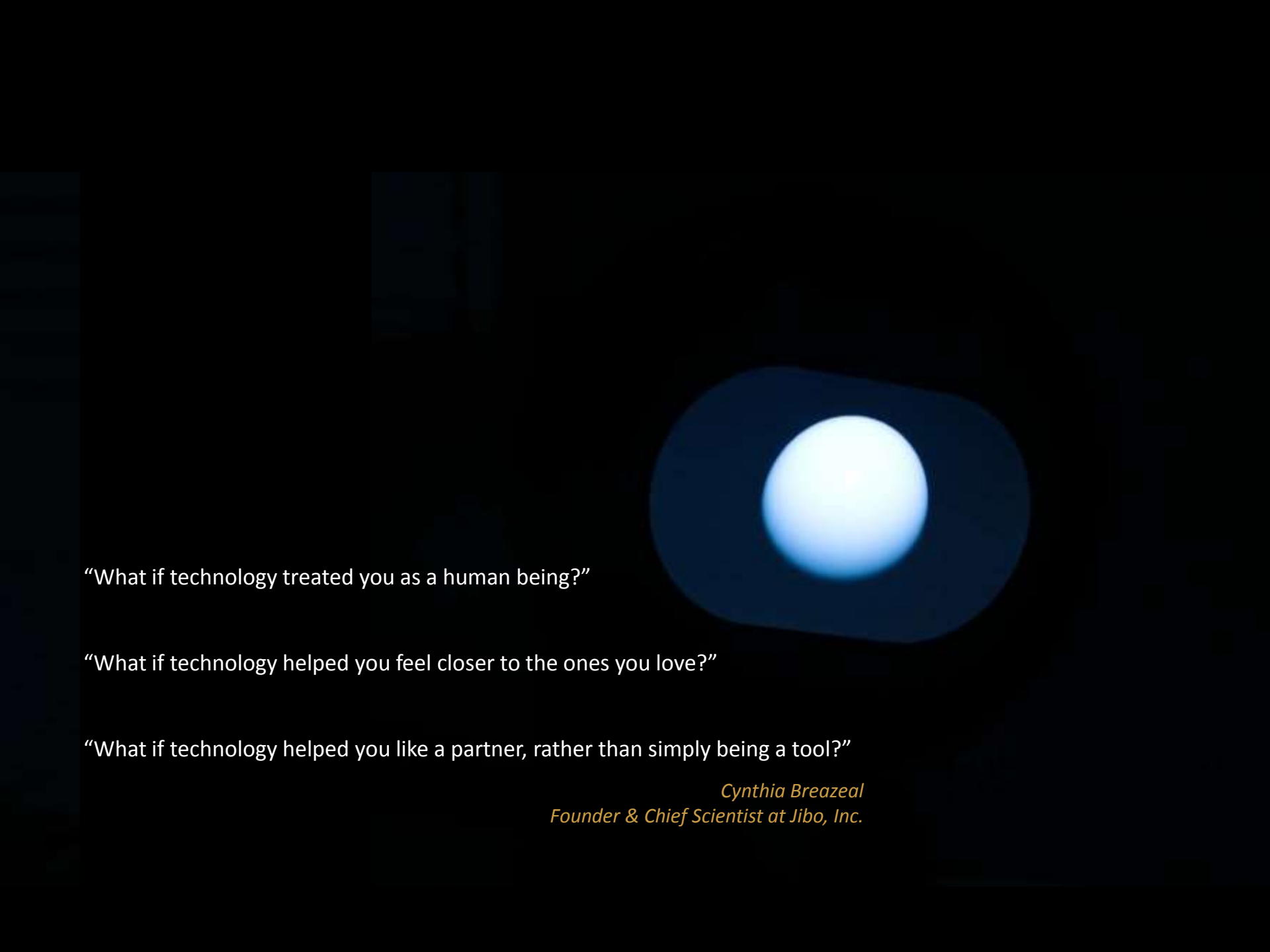
These systems are not programmed.

They are systems that learn and adapt.

And they interact with us in natural ways.


I'm sorry Dave, I'm afraid I can't do that.





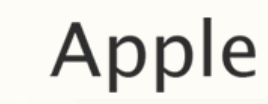
“What if technology treated you as a human being?”

“What if technology helped you feel closer to the ones you love?”

“What if technology helped you like a partner, rather than simply being a tool?”

Cynthia Breazeal
Founder & Chief Scientist at Jibo, Inc.

Interface



Research & Acquisitions

Caffe

A modular deep learning framework (BVLC)

AppOrchid
Where Apps Blossom

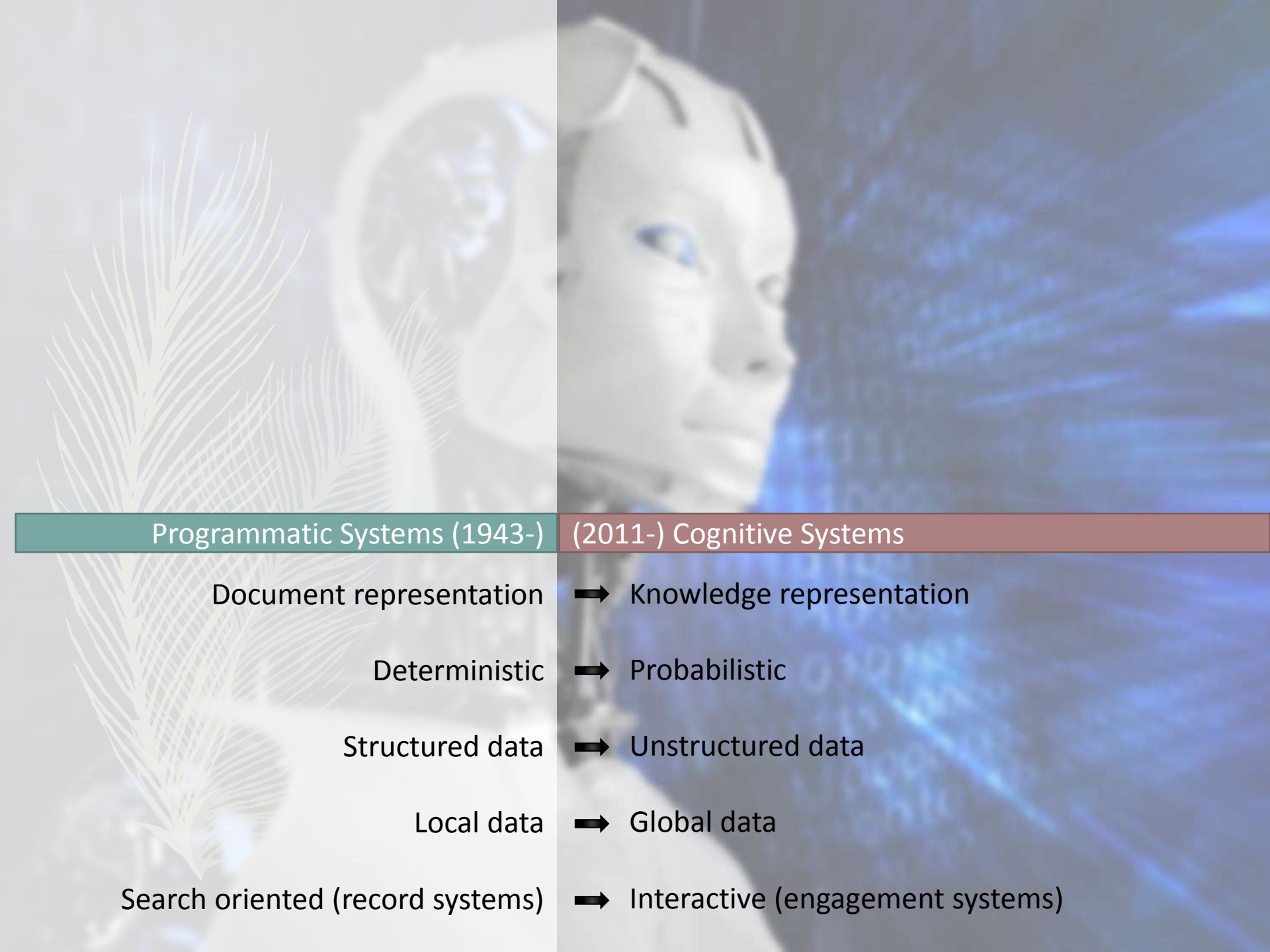
DL4J Deep Learning for Java

clarifai

H2O Deep Learning Architecture

(Very) Recent News

- Facebook **open sources** deep learning **modules** from Torch AI project.
- (Jan 2016) Microsoft **open sources** deep learning **toolkit** available on GitHub.
- (Jan 2016) Yahoo **open sources** 13.5 TB **dataset** for CC research.
- (Dec 2015) OpenAI, a **non-profit** CC research effort by Musk, Thiel, Hoffman, Altman.
- (Dec 2015) Wikipedia uses machine learning to detect malevolent posts.
- (Nov 2015) Google **open sources** TensorFlow, an AI **engine**.
- (Nov 2015) **Merrill Lynch/BoA** report that the robotics/AI market to triple in 5 years.
- (Nov 2015) Toyota opens AI lab in Silicon Valley and Cambridge (200 researchers, $1B in 5 yrs).
- (Oct 2015) Intel acquires Saffron, a cognitive software maker.
- (Oct 2015) IBM highlights Watson ecosystem and **API collection**.



Programmatic Systems (1943-)		(2011-) Cognitive Systems
Document representation	➡	Knowledge representation
Deterministic	➡	Probabilistic
Structured data	➡	Unstructured data
Local data	➡	Global data
Search oriented (record systems)	➡	Interactive (engagement systems)

Use Cases & Applications

Personal Assistance

- *Infuse personality into virtual assistants (IBM Cognea, Siri, Cortana)*
- *Understand the personality of users*
- *Understand context (Abi by Allstate)*
- *Predictive input (ClarifAI)*

Recommender Systems

- *Dynamic content (Facebook)*
- *Advertising (Facebook)*

Translation

Skype Translate (live voice translation system)

Anomaly Detection

- *Spam filtering*
- *Malevolent post detection (Wikipedia's ORES)*
- *Fraud detection (AMEX*)*

Transcription

- *Speech to text*
- *Closed captioning*
- *Type correction*

Speech Recognition

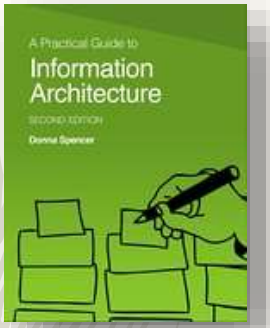
Voice search on Android (Google)

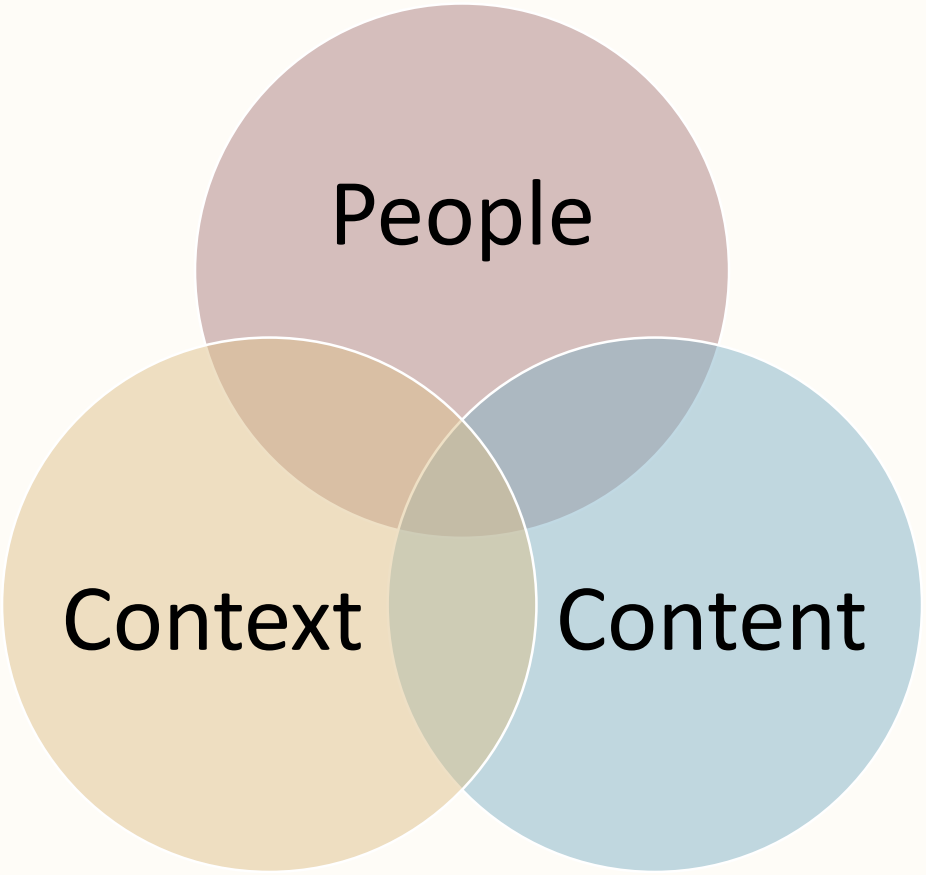
Sharing

Automatically share photos (Facebook's DeepFace)

Face/Image Recognition

- *Tagging photo collections (Baidu, Facebook's DeepFace, Google)*
- *Activity-recognition and indexing (MIT)*
- *Treezam?*





Good IA Needs:

People: What do they do? How do they think? What do they know?

Content: What do you have? What should you have?

Context: What are the goals of the solution? Who else will be involved? What are the constraints?

"A Practical Guide to Information Architecture" by Donna Spencer (2010)

Re-Assessing the User

Users have goals (forget queries)

- *They may not know what they need*
- *Fluid understanding problems and goals (as more is learned)*
- *Stymied by big data (information overload on steroids?)*

Users want results and answers (forget content)

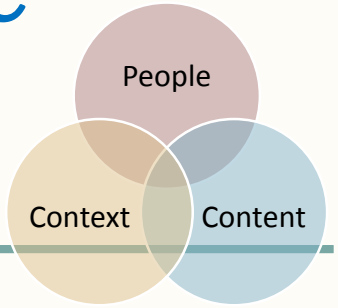
- *Browsing knowledge, not stuff (Google's Knowledge Graph)*

Context is the foreground (users are partners)

- *Tweets, public records, blogs, purchasing patterns, friend connections, travel patterns, where we grew up, languages we speak, pets we have, education, neighborhoods we live in…*

New Questions: **People**

What do they do? How do they think? What do they know?



What are their goals?

Where are they? Who's with them? What's near them?

Are they bored, scared, frustrated?

Are they acting unusual?

Have they tried this before?

What do they really need?

What kind of help are they ready for?

Can I encourage them?

What don't we know yet?

What's the context?

How are they feeling?

How far did they get? Did I help them?

Re-Assessing Information

Deconstructing IA: *Stepping back from linguistics*

Semiotics

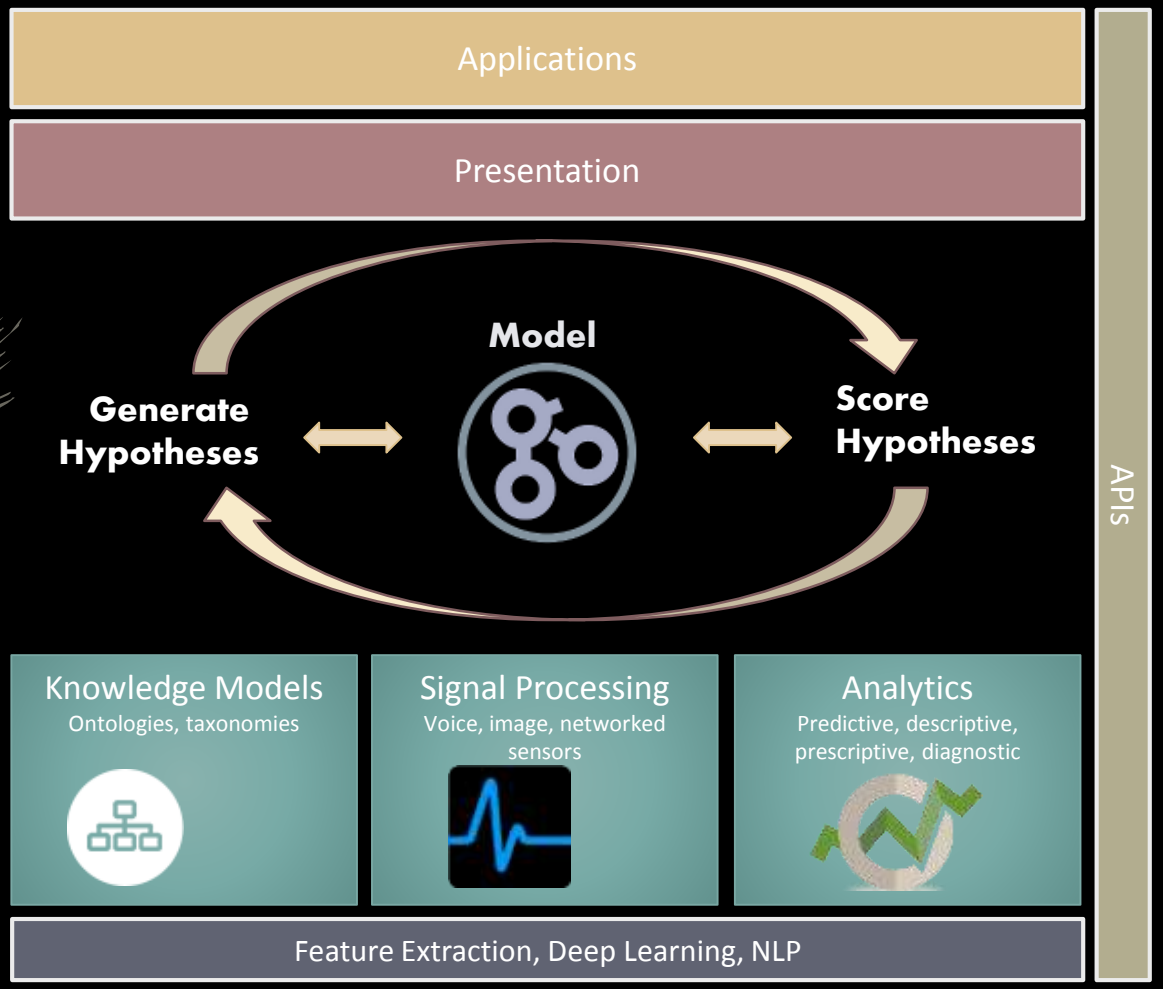
The study of meaning-making (signs, indication, designation, likeness, analogy, metaphor, symbolism, signification, communication).

"A Mathematical Theory of Communication" (*Claude E. Shannon*)

Communication is a message conveyed with a signal.

Advancing Cognitive Technologies in the Enterprise

IX & UX Opportunities



Elements of a cognitive system from "Cognitive Computing and Big Data Analytics" by Hurwitz, Kaufman, & Bowles

How could you serve your users better
with cognitive technologies?

Thank You

Paul Michael King
Lead Information Architect
Healthwise, Inc.