Ganging Up on Big Data

Computer-Intermediated Collaborative Analysis

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Augmented Team Intelligence (ATI)

Our Approach: Studying and engineering team intelligence as a process.

- Systems whose intelligence arises from the combined cognitive activities of **teams of people and computers**.

- Creating computer-supported teams that **perform better than** people or computers alone.

- Optimizing the performance of human-computer teams on real world problems.
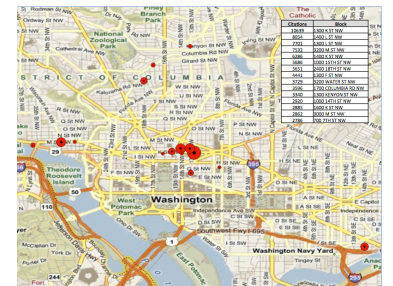
Outline

Freestyle Chess

- The Surprise

- Why Human + Computer Teams Win

Moving to Open Worlds

- Computer and Human Advantages, Revisited

- Speed and Knowledge

- Roles in Rapid Learning

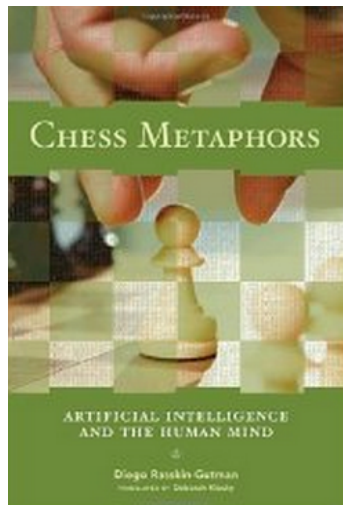## Looking Backward and Forward

Game Changer

Playing Deep Blue, 1997

from a review of *Chess Metaphors*
The Chess Master and the Computer
February 11, 2010
NY Times Review of Books
by Gary Kasparov

"Anyone could compete in teams with other players or computers ('centaurs').

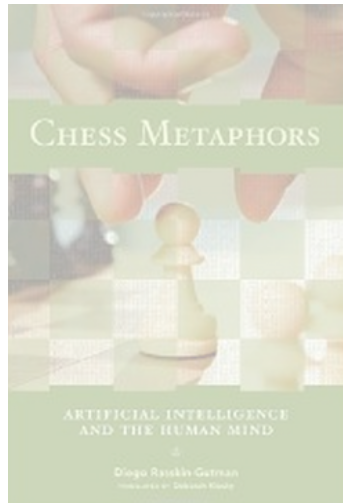At first, the results seemed predictable.

The teams of human plus machine dominated even the strongest computers. "

2005 "Freestyle" chess tournament
A Surprise

Playing Deep Blue, 1997

"The **surprise** came at the conclusion of the event.

The winner was revealed to be **not a grandmaster with a state-of-the-art computer**

but a pair of amateur American chess players using three computers at the same time."

from a review of *Chess Metaphors*
The Chess Master and the Computer
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Weak human + machine + **better process**	*beats*	Strong human + machine + **inferior process**

Why H + C Teams Win[*]

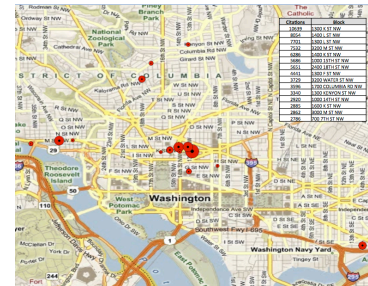| Entity	Advantage	Explanation
Chess program	Speed	• Faster generating and testing moves. • Systematic & tireless. • Avoids simple errors.
Qualified human player	Knowledge (& perception)	Improves how computer spends its time with better pruning.

Small teams have the advantages of both.

Can We Generalize the Results?

Changing the rules

| World	Closed	Open
Characterization	Rules are known.	New rules are discovered or invented.
Challenges	• Find best plays in huge combinatorial space	• Ditto • Knowledge acquisition through learning • Rapid adaptation

Advantages, revisited

| Entity	Advantage	Explanation	But ...
Qualified program	Speed	• Faster generating and testing actions, etc. • Fast processing scaling over **big data.**	• Generator not complete. • Data not a complete representation of the world.
Qualified human expert	Knowledge (& perception)	• Many hours of experience in the (open) world. • Multi-disciplinary teams have diverse experience and can solve more kinds of problems.	• Assuming low coordination costs.
H/C Together	Joint trainability	Many options for anomaly detection, supervised and other kinds of machine learning.	• Training at scale requires architectural provisions.

Can Augmented Teams get the advantages of both?

Thought Experiment: Intelligent combining of information
Three Haystacks Story
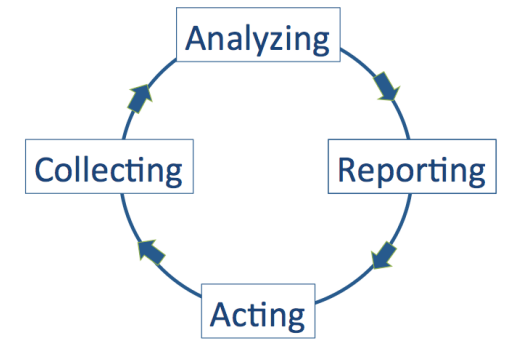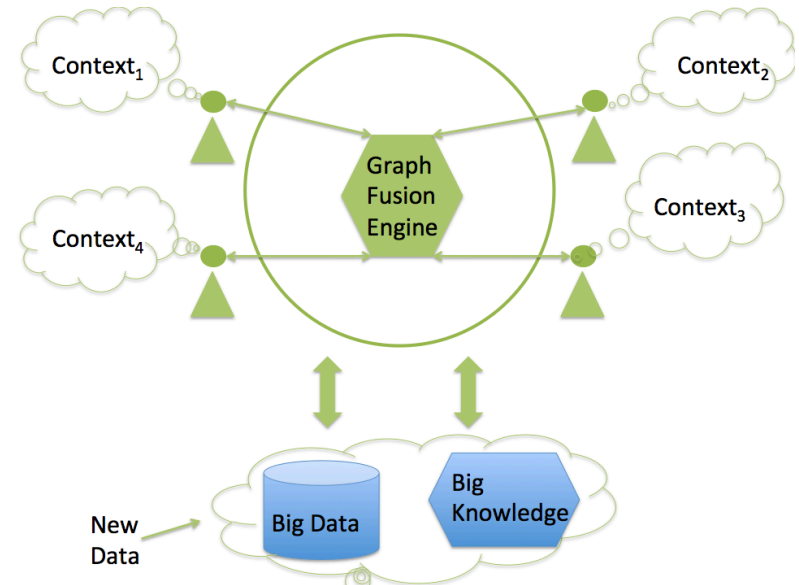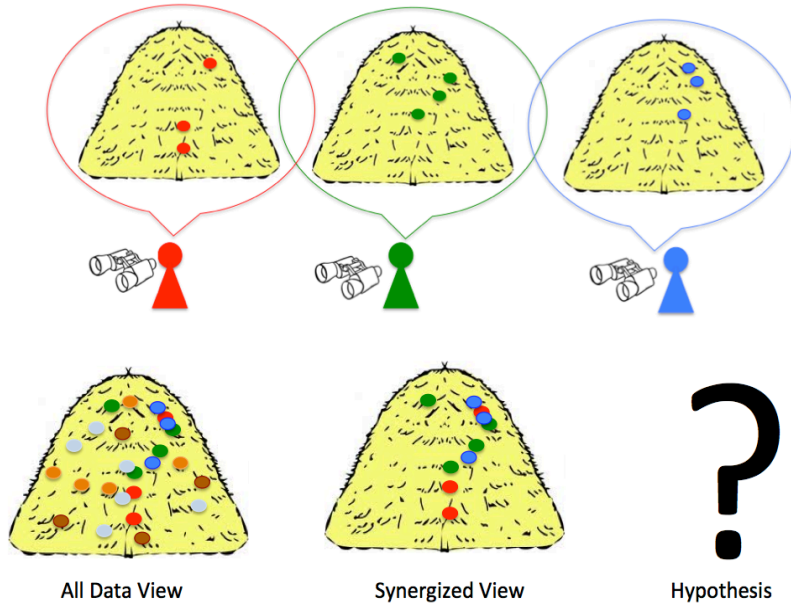
Automating Known Patterns

When a known kind of event is understood, train the system to automatically recognize instances.
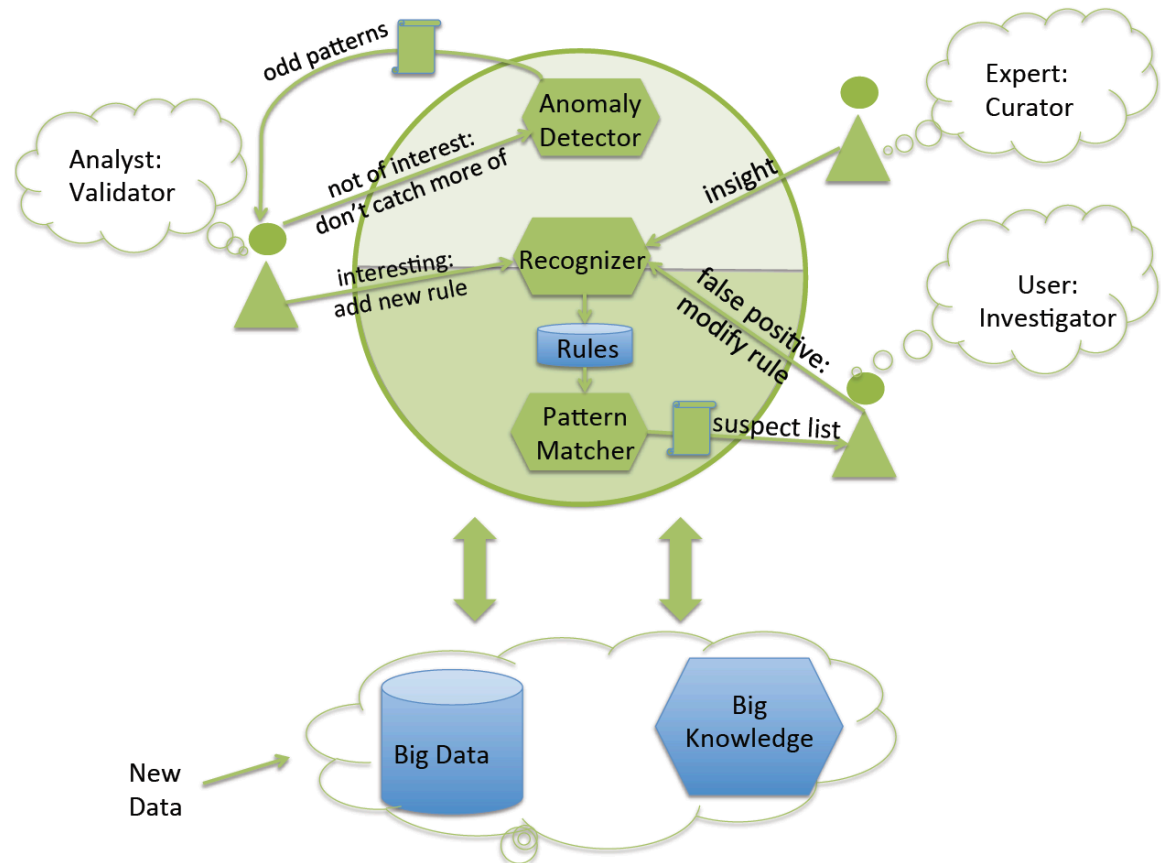
Human roles: analysts & curators
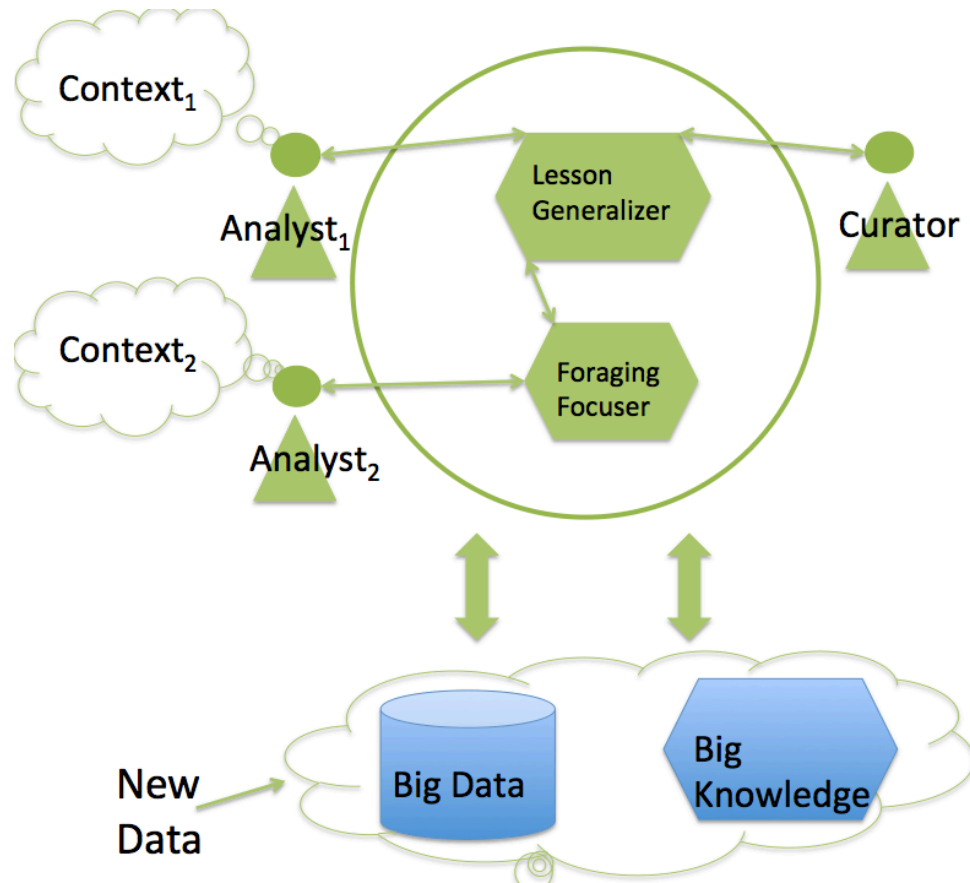
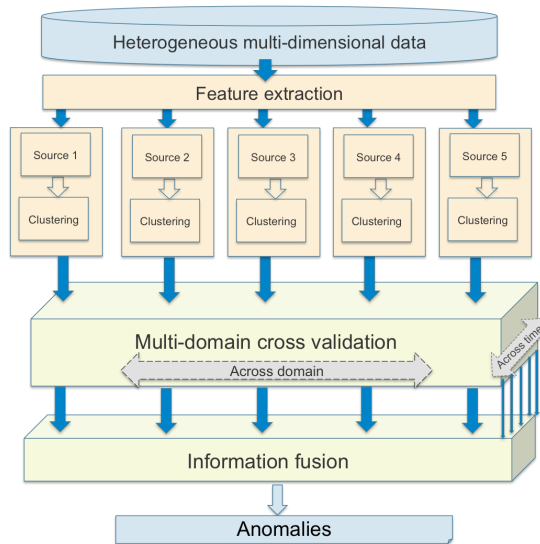# Thought experiment: when new kinds of events arise
Rapid Learning

Noticing when significant events occur that do not fit current models.

Human roles: investigators, curators, validators, curators, users, ….

Some PARC Examples

ADAMS

Insider threat detection by analyzing employees' computer activity logs to discover suspicious patterns.
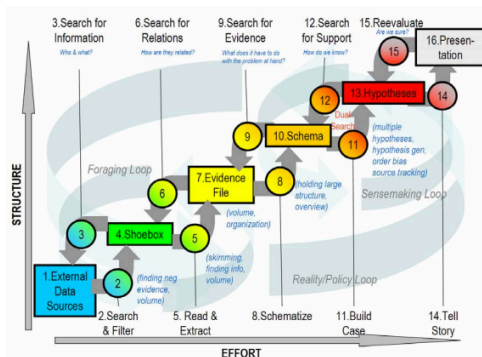
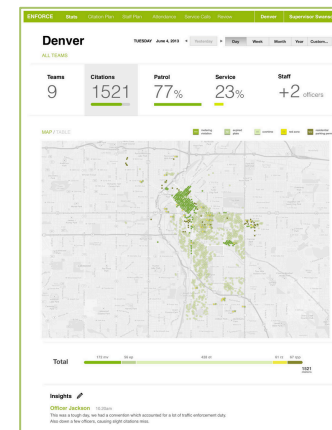Unusual change detection

Kiffets - Personalized News

"The light work of the many, the hard work of the few, and the tireless work of the machines."
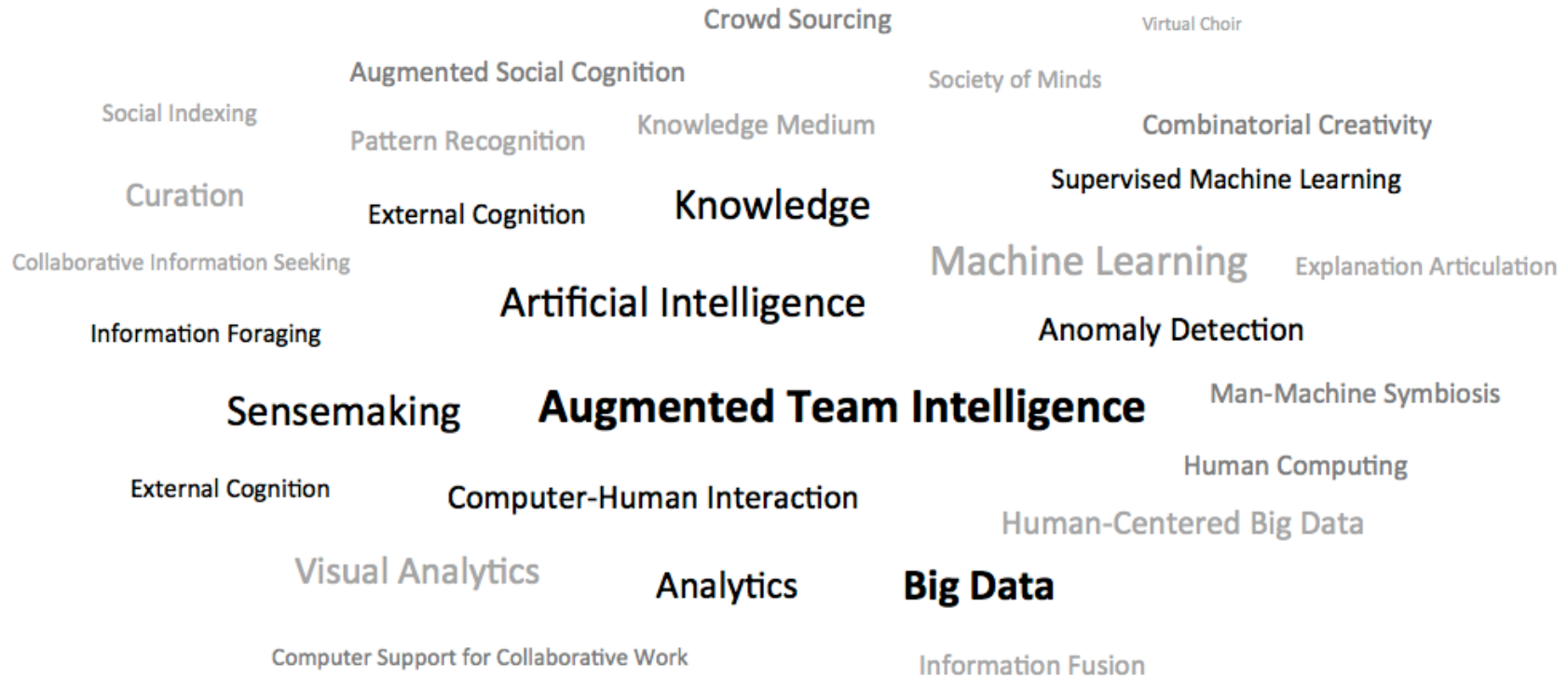
NIMD & Sensemaking

Deep model of intelligence analysis process. Integrated natural language and visual analytics systems;

CitySight™

Workflow, analytics and revenue optimization system for urban departments of transportation.

Looking Backward and Forward

Crowd Sourcing

Virtual Choir

Augmented Social Cognition

Society of Minds

Social Indexing

Knowledge Medium

Combinatorial Creativity

Pattern Recognition

Supervised Machine Learning

Curation

External Cognition

Knowledge

Collaborative Information Seeking

Machine Learning

Explanation Articulation

Artificial Intelligence

Anomaly Detection

Information Foraging

Sensemaking

Augmented Team Intelligence

Man-Machine Symbiosis

External Cognition

Computer-Human Interaction

Human Computing

Human-Centered Big Data

Visual Analytics

Analytics

Big Data

Computer Support for Collaborative Work

Information Fusion

- Isaac Asimov (1950) & others – robotics stories
- William Ross Ashby (1956) **Intelligence Amplification**
- J.C.R. Licklider (1960) **Man-Computer Symbiosis**
- Douglas Engelbart (1962) **Augmenting Human Intellect**
- I.J. Good (1963) **Ultra-intelligent Machines**
- Marvin Minsky (1985) **Society of Mind**

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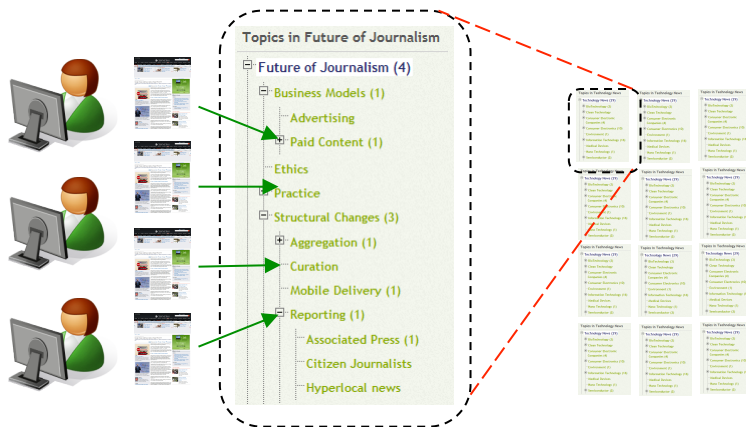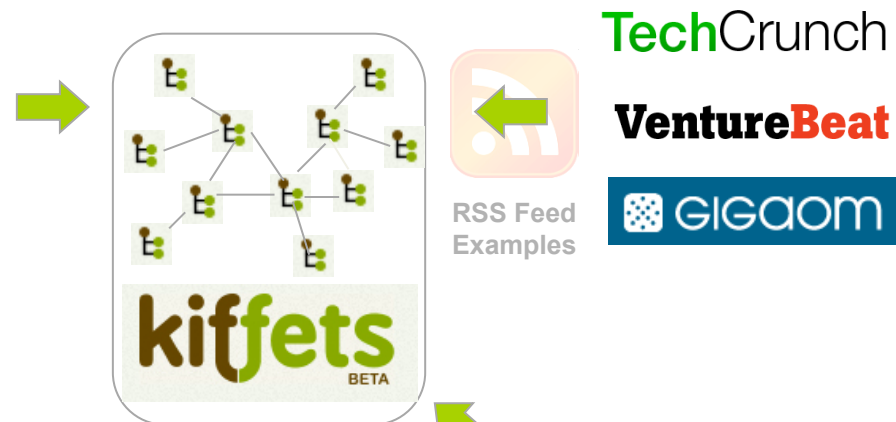
Thank You

Backup Slides

How It Works

1. Your editors define topics and point of view for curated collections ("channels") and provide training examples

2. Your editors specify good sources and Kiffets recommends good sources based on activities of other curators

kiffets BETA

TechCrunch

VentureBeat

GIGAOM

RSS Feed Examples

3. Kiffets classifies articles from feeds into channels and topics, and identifies relationships between articles and topics

4. Kiffets API allows you to retrieve related topics and articles to augment original content