



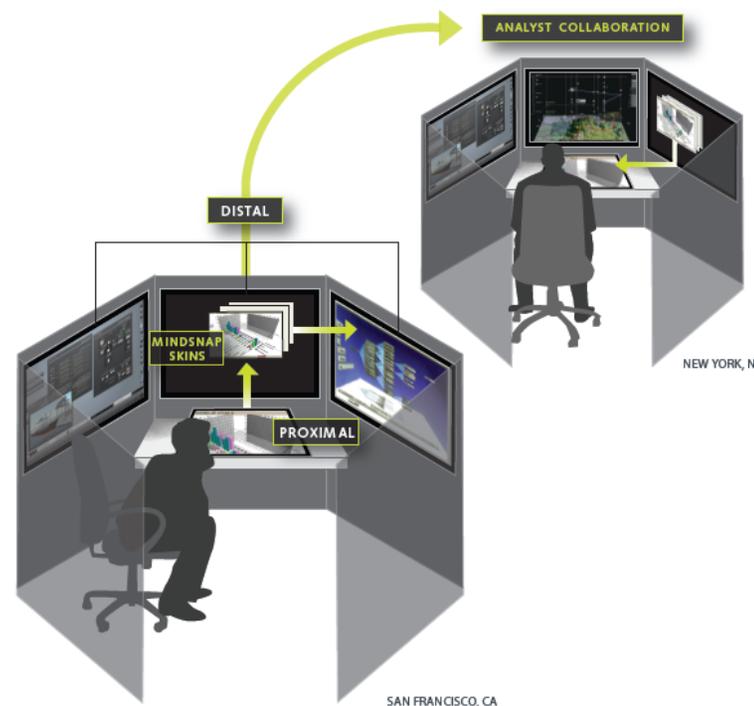
Working through Synthetic Worlds: Time Machine & Mind Snaps

23 April 2009

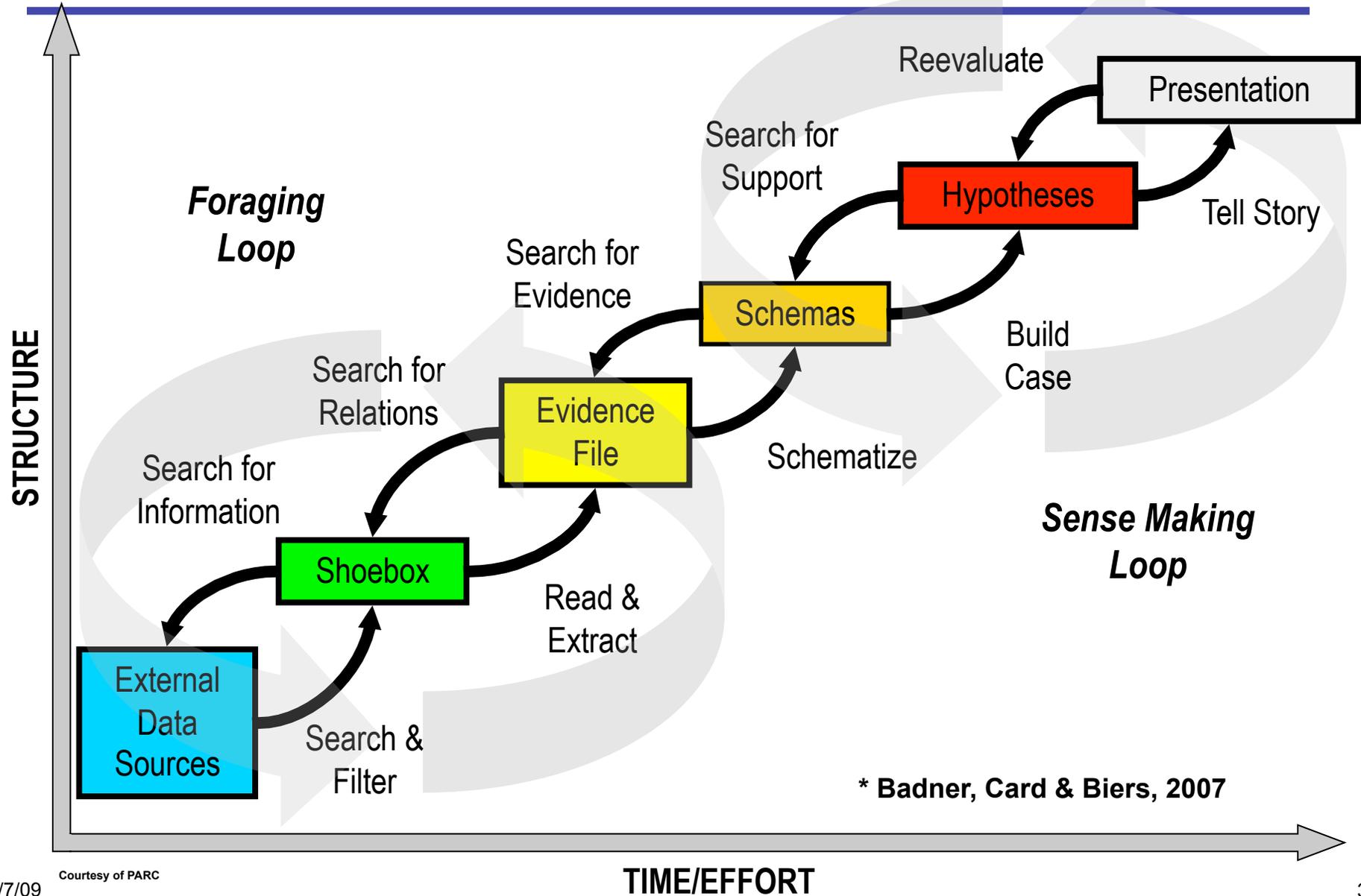
Dr. Jeffrey G. Morrison

Background

- **What do intelligence analysts do?**
 - Premise:
 - Analysts marshal data, formulate hypotheses, tell stories.
 - Data Screening
 - Therefore: Analysts are creative.
- **What makes their job hard?**
 - Security requirements
 - Culture discourages collaboration
 - Huge amounts of data
 - Conventional IT is not optimized to support the creative process.

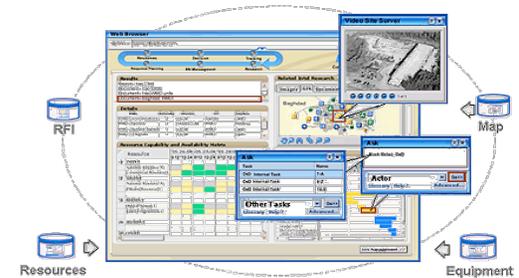


The Analytic Process



Problem

- Analysts work with underperforming Information Technologies (IT) – Impacting analytic capabilities
 - Legacy IT provides tools that are *agnostic to context* – they have no awareness of what an analyst is doing.
 - Tools *non-holistic* to analytic process.
 - The burden is on the *analysts to remember vast amounts of data*, make inferences across this disparate data, and ultimately *provide meaning*.
- Context is key to the analytic process ... Change is a critical part of context.
 - Tools are typically insensitive to time or change:
 - The temporal aspects of *data* & how it changes;
 - The *thinking* about data & how it changes.



Approach



Transform analysis by creating a workspace that...

- *Integrates virtual worlds & workflow management technologies to dynamically exploit context & time.*
- Transform the analytic process by enabling creativity & productivity (workflow): Marshal data more efficiently, create better hypotheses faster, share insights sooner.

Synthetic World CONOP

- **N-Dimensional data and how it is being thought about will be represented, shared, and exploited through the development of multi-dimensional, coherent, *synthetic worlds*.**
 - Multiple Synthetic worlds optimized to support different analytic problems.
 - A-Desk provides a consistent Human-Computer Interface (HCI) CONOP for exploiting virtual worlds
 - Dedicated workspaces to serve as windows into synthetic worlds that facilitate the exploration of both: *Complex Data* & how it changes over time.
 - Workflow management technologies that capture the *Analytic Process* & how it changes over time.



Synthetic Worlds: Time Machine

"It's about time..."



- Time Machine represents n-dimensional data and how it changes. It may be tied to a physical location.
- It allows a variety of abstractions of data to be embedded, layered, compared.
- Context “lens & filters” make it possible to highlight different kinds of data, or ignore it.
- Exploring the data:
 - Analysts can work from a “here and now”— then compare it to possible futures, by assessing a “then and there.” Develop potential hypotheses. Evaluate based on what is known now.
 - Analysts could hypothesize a discrete future – then assess viability based upon known / unknown data.
 - Analysts can do forensic and proactive analysis, by viewing past/future perspectives.

Synthetic Worlds: MindSnaps

"It's about mind..."

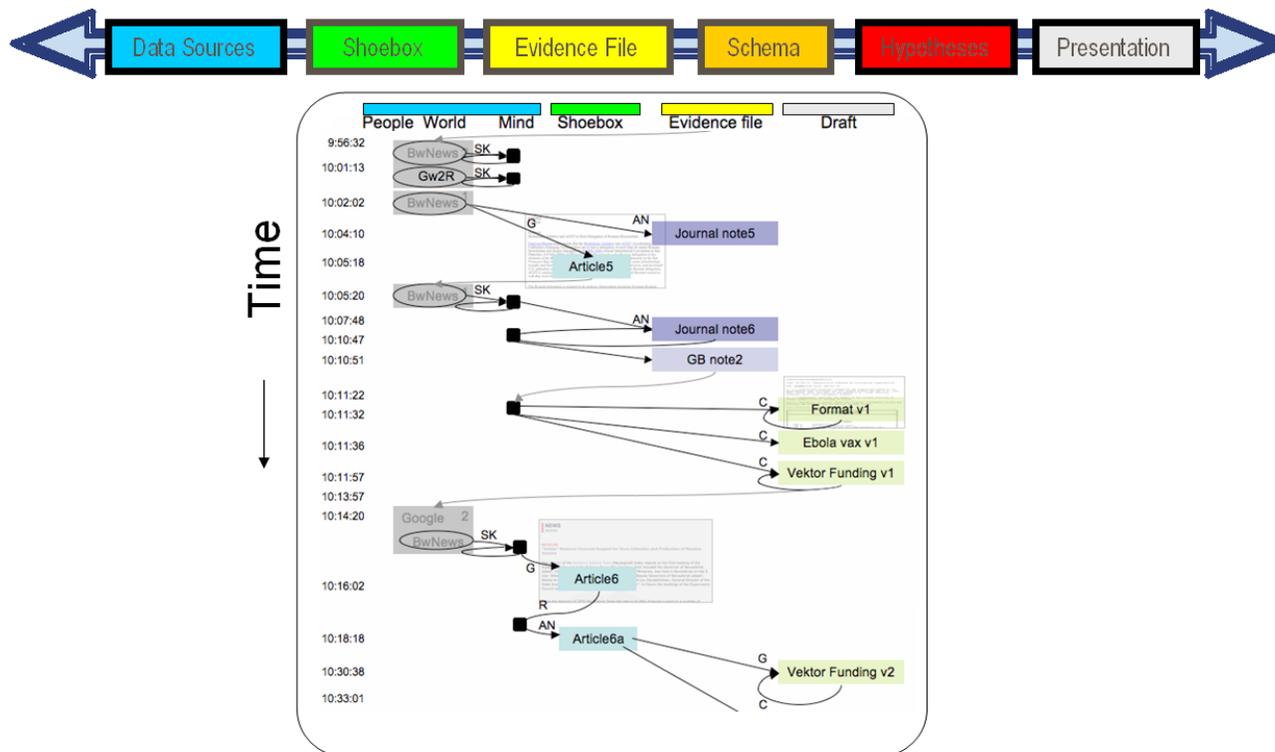


- MindSnaps are “mental bookmarks” that will allow an analyst to explore their own analytic process – Automatically derived from changes in analytic workflow.
- MindSnaps are graphically shown as decision nodes in a “Decision Space” synthetic world.
 - Nodes capture story structure as a template.
 - Nodes include pop-up summary of what was being worked on when the MindSnap was taken.
 - Themes: Nodes organized around related themes. Story relates to an analytic problem.
 - History: Capture the analyst’s reasoning process over time.
- Workspace can be rapidly reconfigured to resume analysis by pulling a decision node from the Decision Space into a proximal display.
 - Viewpoint may be shifted to collaborate with another analyst & share decision nodes.
 - Agents highlight changed and inconsistent data when a MindSnap is restored.

What is a MindSnap?

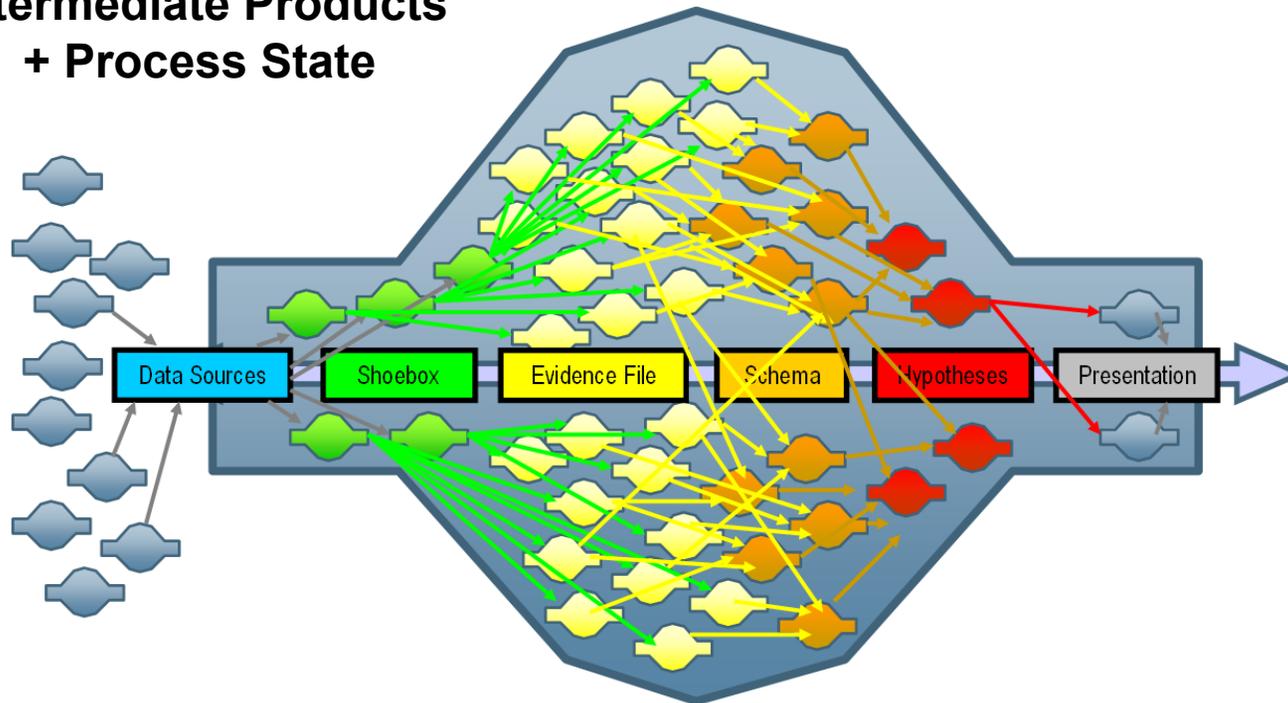
MindSnaps will capture state changes from the analyst's process.

- E.g. the workflow context defined by activities with an analyst's work objects as they relate to the overall analytic model



What are MindSnaps?

Intermediate Products + Process State



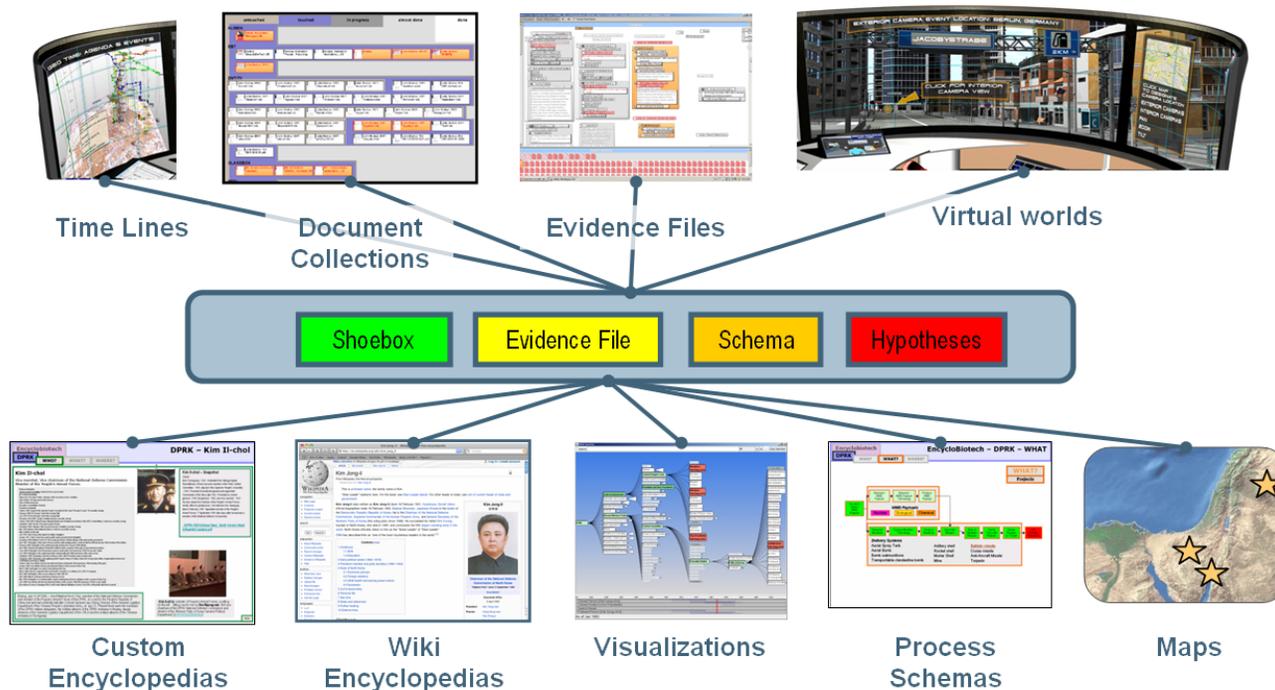
A MindSnap may include one or more of the intermediate products of analysis, such as:

- **Shoebox:** a hand-picked collection of documents that appear to be relevant.
- **Evidence File:** a representation of entities and facts about a case.
- **Schemas:** Ways of organizing the evidence often based on a model of a kind of activity.
- **Hypotheses:** Alternative interpretations of the evidence.

What is in a MindSnap?

MindSnaps include data from both traditional and new analytic tools, as well as other applications within the workstation.

- Anything available within the HCI could be fodder for incorporating into a MindSnap.
- Events detected from the Operating System & Applications will serve as event triggers and provide context for creating, managing & re-using MindSnaps.



Spatiotemporal Query Language

MindSnaps should directly support the analysis technique known as “Pivoting” where information in one source, suggest one or more possible relationships to information in other sources.



Working Through Synthetic Worlds

(In Press: December, 2009)

Book Title: *Working Through Synthetic Worlds*

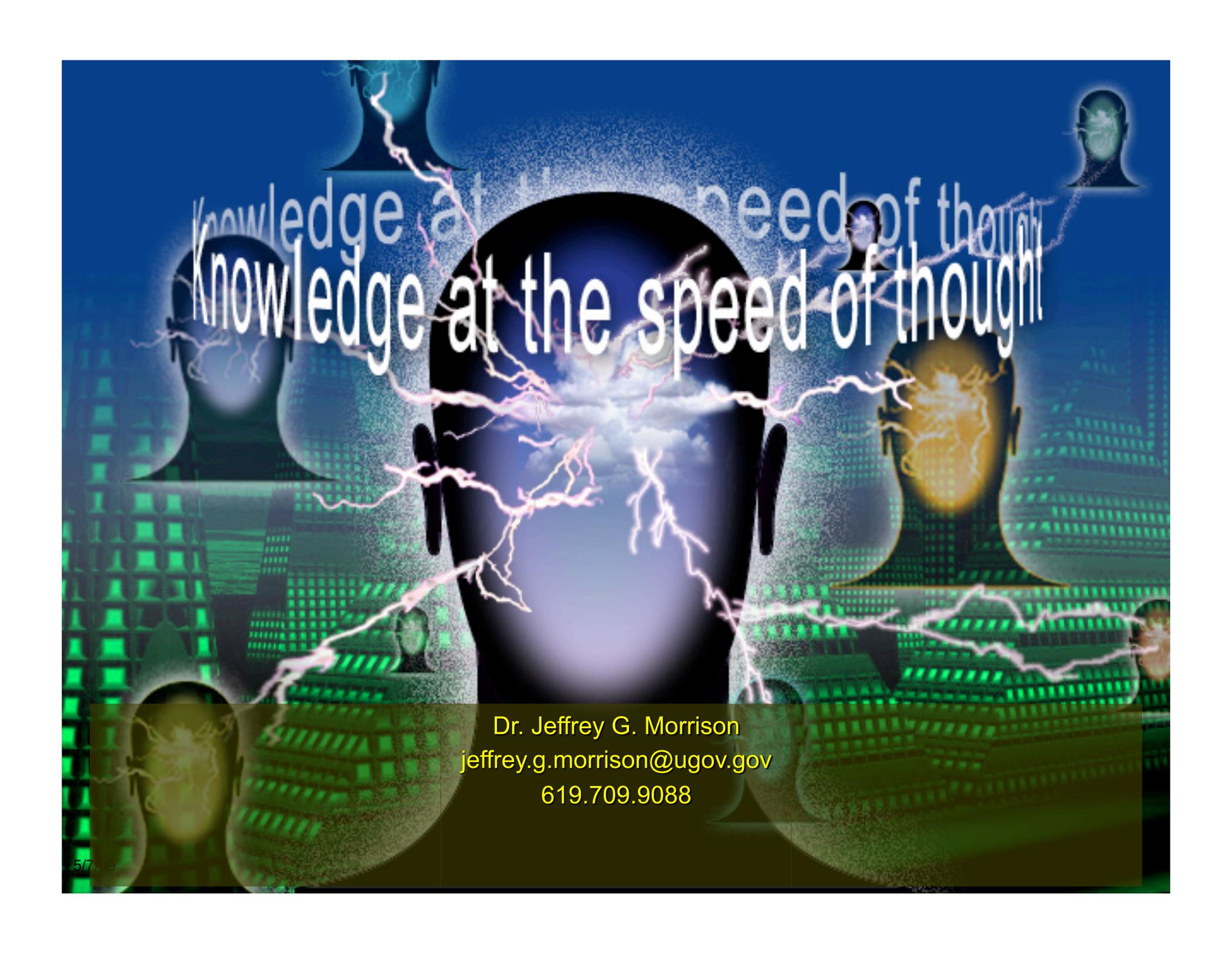
Eds.: C.A.P. Smith, Jeffrey G. Morrison and Kenneth W. Kisiel

Overview: This book describes ways that one might exploit the potential of Virtual Environments and Synthetic Worlds. The proposed book will limit its focus to those forms of Synthetic Worlds that facilitate some form of productive work. In particular, the book will be comprised of a series of essays proposing the use of Synthetic Worlds in specific work contexts. Each chapter includes a day-in-the-life for a job using Synthetic Worlds, a discussion of the technical / social challenges implied, and recommended research topics to enable the vision.

21 Chapters with five Major Themes:

- Synthetic Worlds for Forecasting,
- Synthetic Worlds for Forensic Analysis,
- Synthetic Worlds as Cognitive Amplifiers,
- Synthetic Worlds for Training, and
- Synthetic Worlds Infrastructure.

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Knowledge at the speed of thought
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