

Doug's Core Technical Ideas

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KNOWLEDGE FEDERATION

2016

DOUG ENGELBART'S UNFINISHED REVOLUTION

1



THESE SLIDES ARE MADE BY DOUG HIMSELF

prepared for Doug's 2007 Google talk



A Call to Action!

Google

August 22, 2007

Douglas C. Engelbart

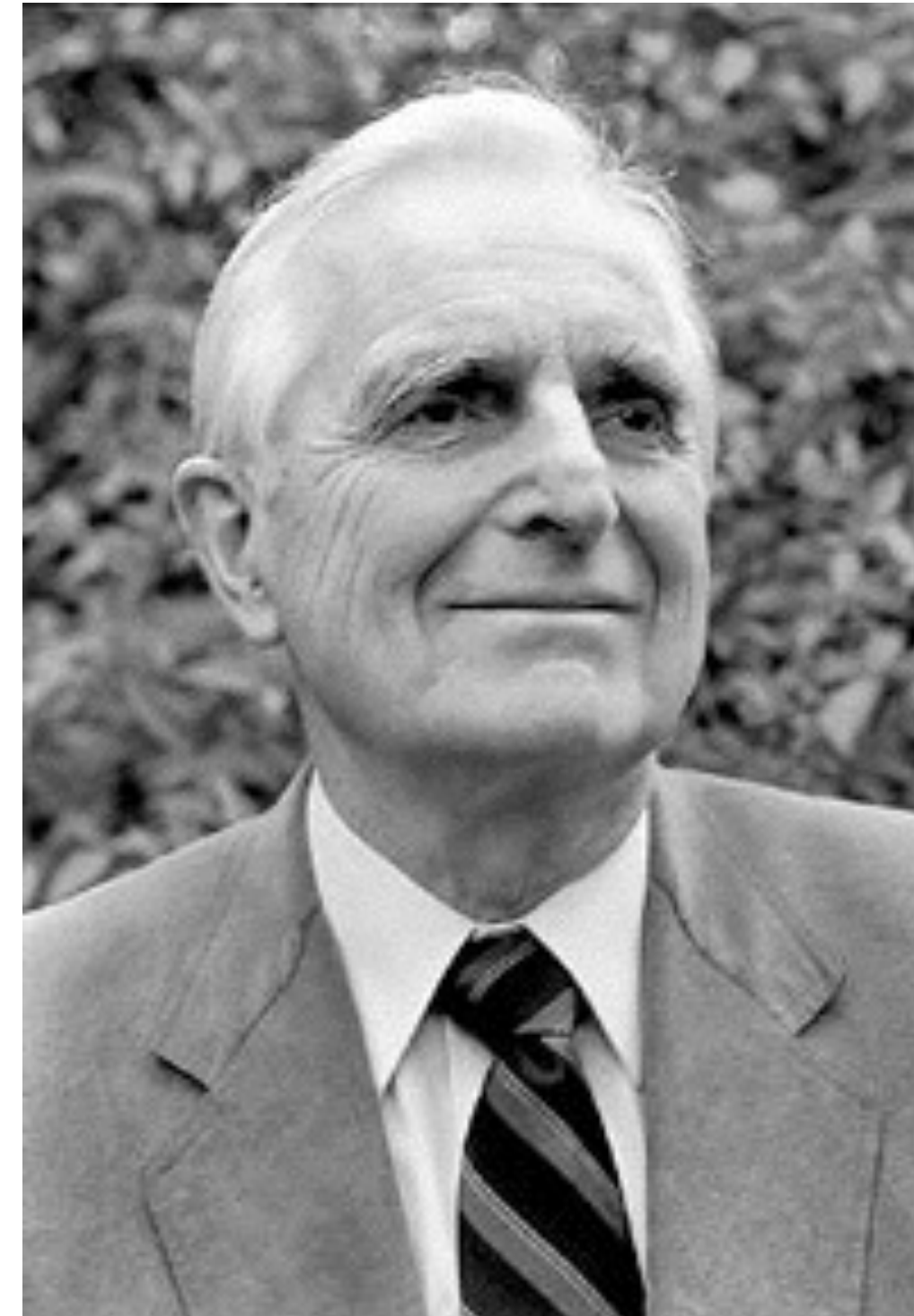
Peter Norvig

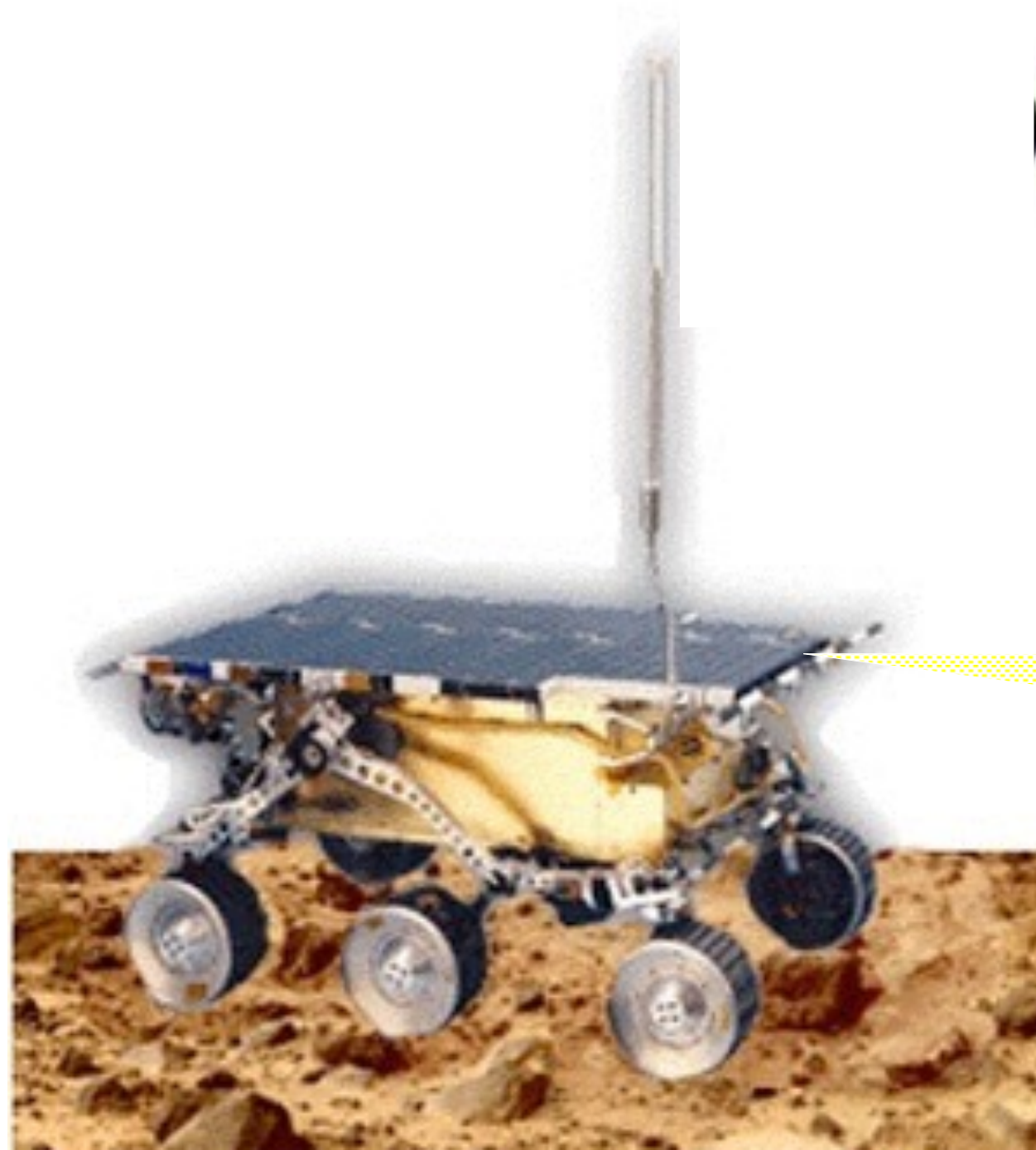
Vaughan Tan

Mei Lin Fung

***Digital technology
could help make
this a better world.***

***But we've also got
to change our way
of thinking.***





We ride a common economic-political vehicle

Traveling at an ever-accelerating pace through increasingly complex terrain.

Our headlights are dim and blurry

We have totally inadequate steering and braking controls.



Many years ago, I dreamed that digital technology could greatly augment our collective human capabilities for dealing with complex, urgent problems.

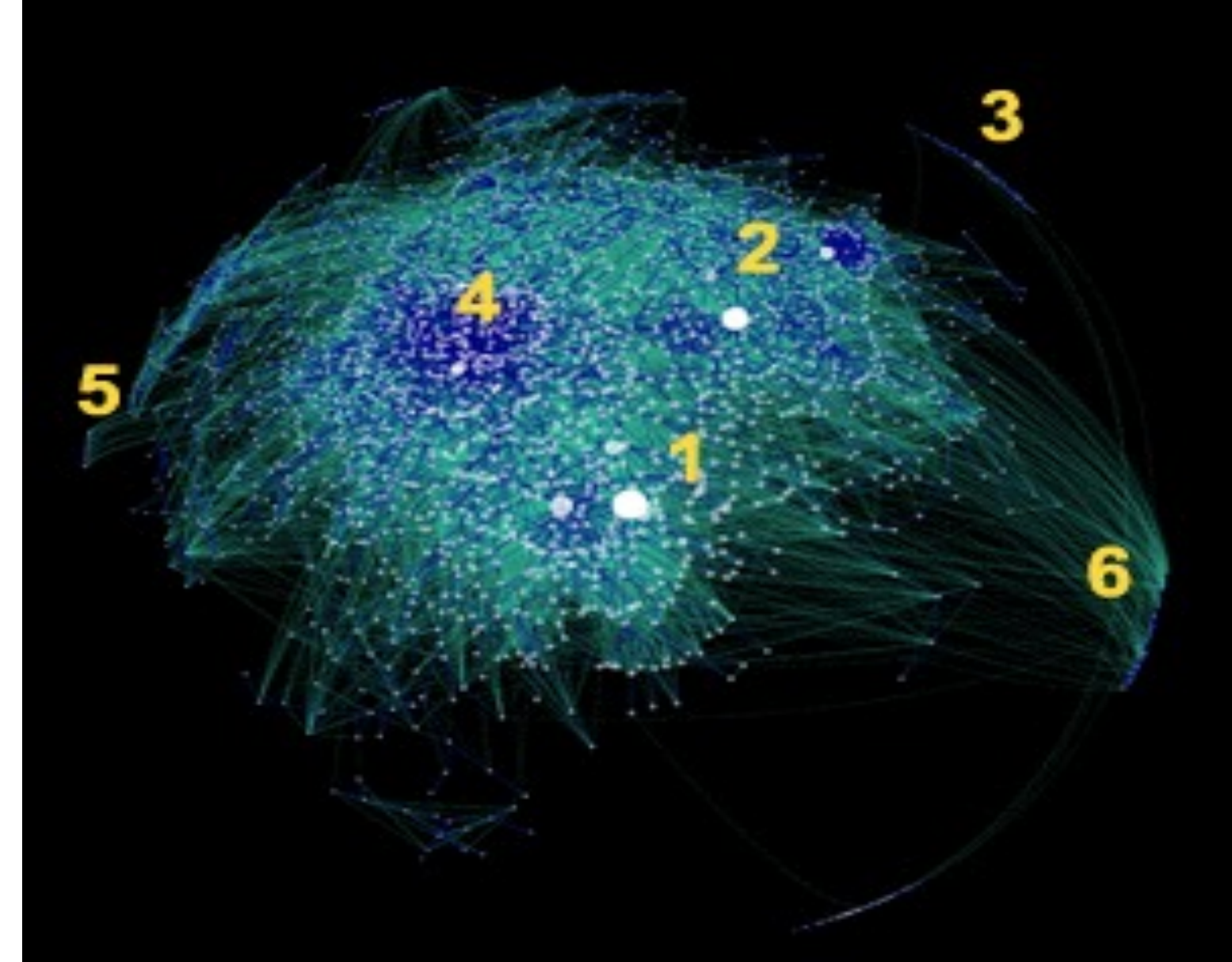
Computers, high-speed communications, displays, interfaces--it's as if suddenly, in an evolutionary sense, we are getting a super new nervous system to upgrade our collective social organisms.

I dreamed that people could seriously appreciate the potential of harnessing that technological and social nervous system to improve the collective IQ of our various organizations.

I dreamed that we began to form cooperative alliances of organizations to develop and apply new collective knowledge.

I call these alliances NICs or Networked Improvement Communities.

New technologies enable more effective distributed collaboration with promising potential for shared risk and benefits.

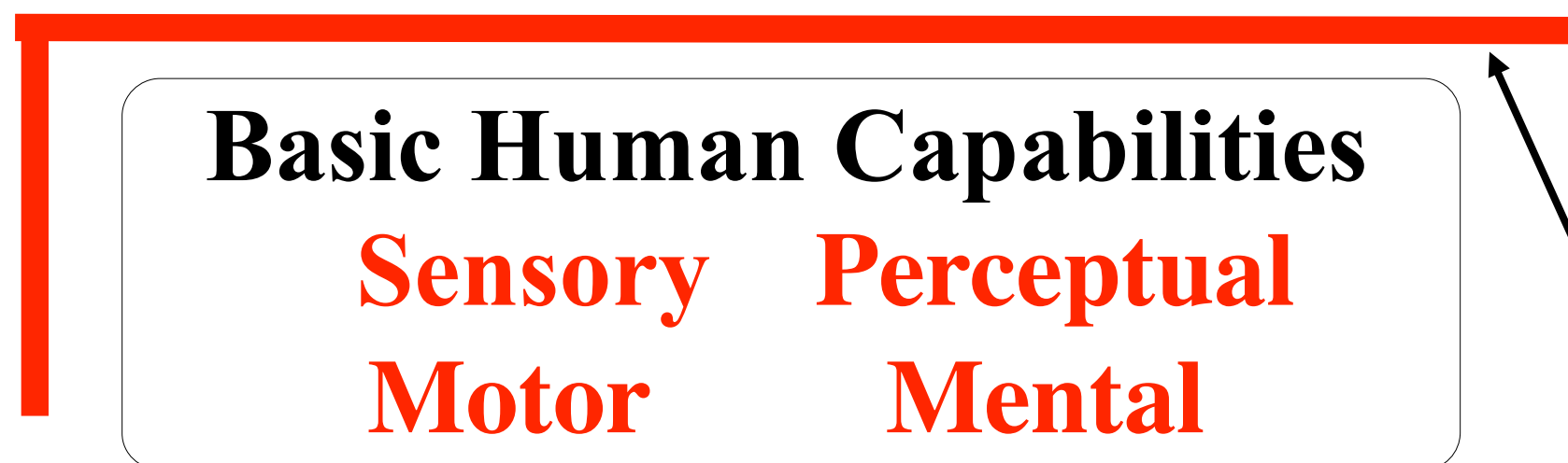
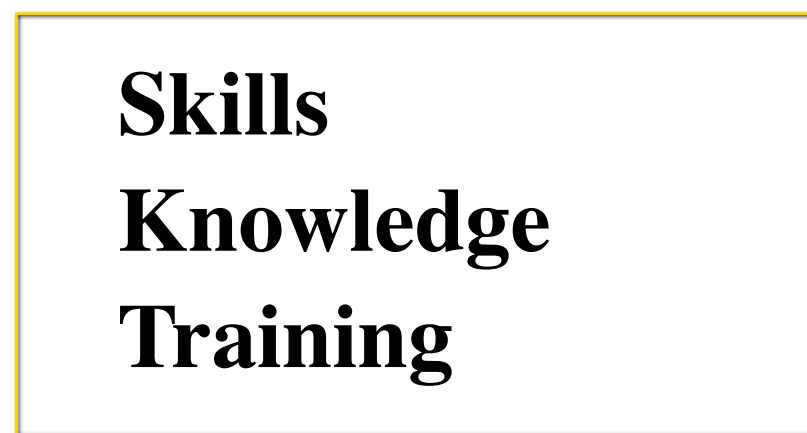
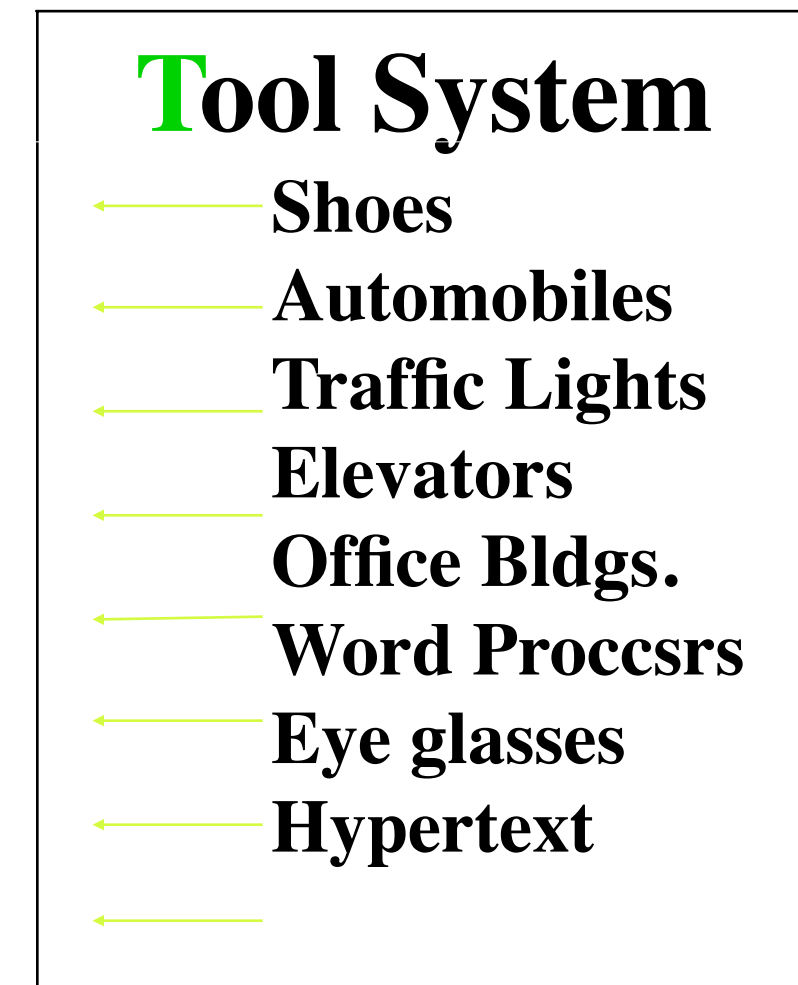
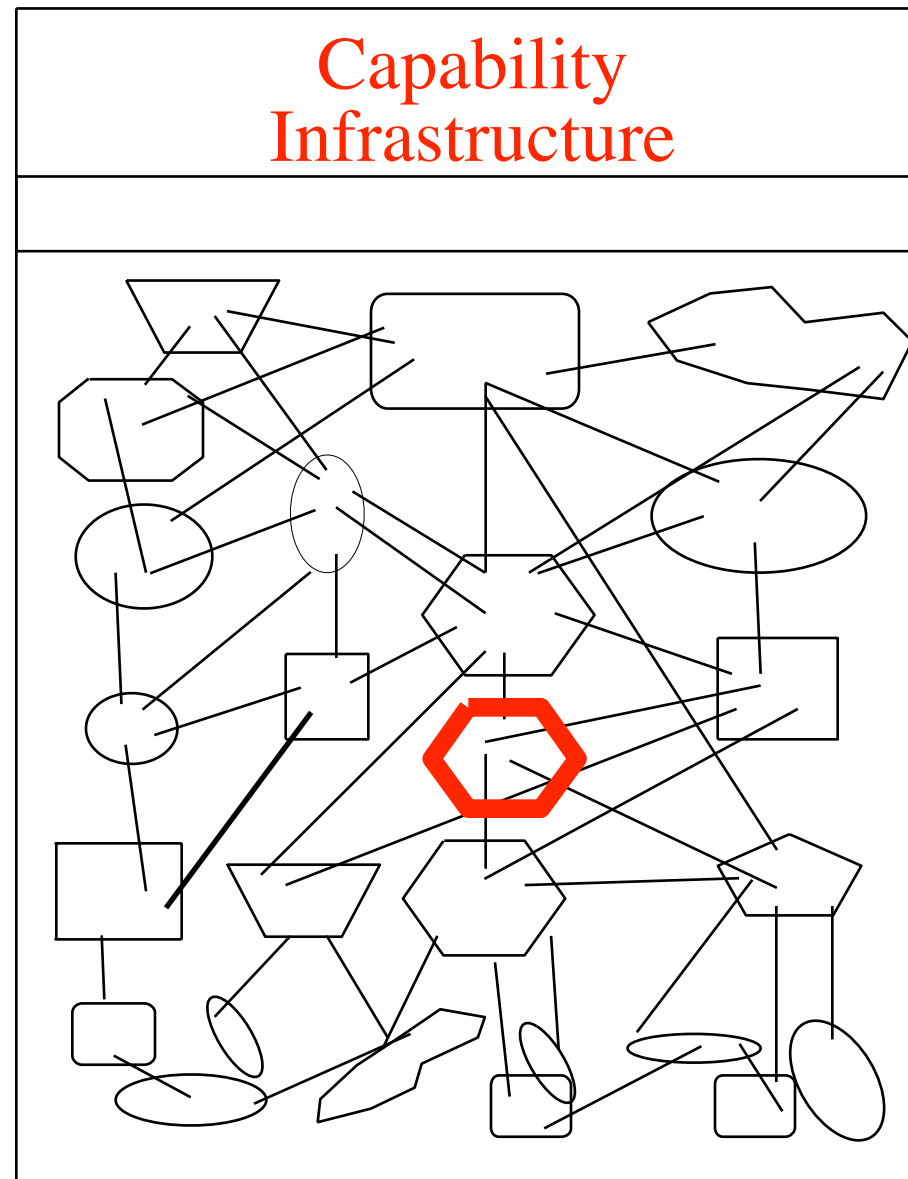
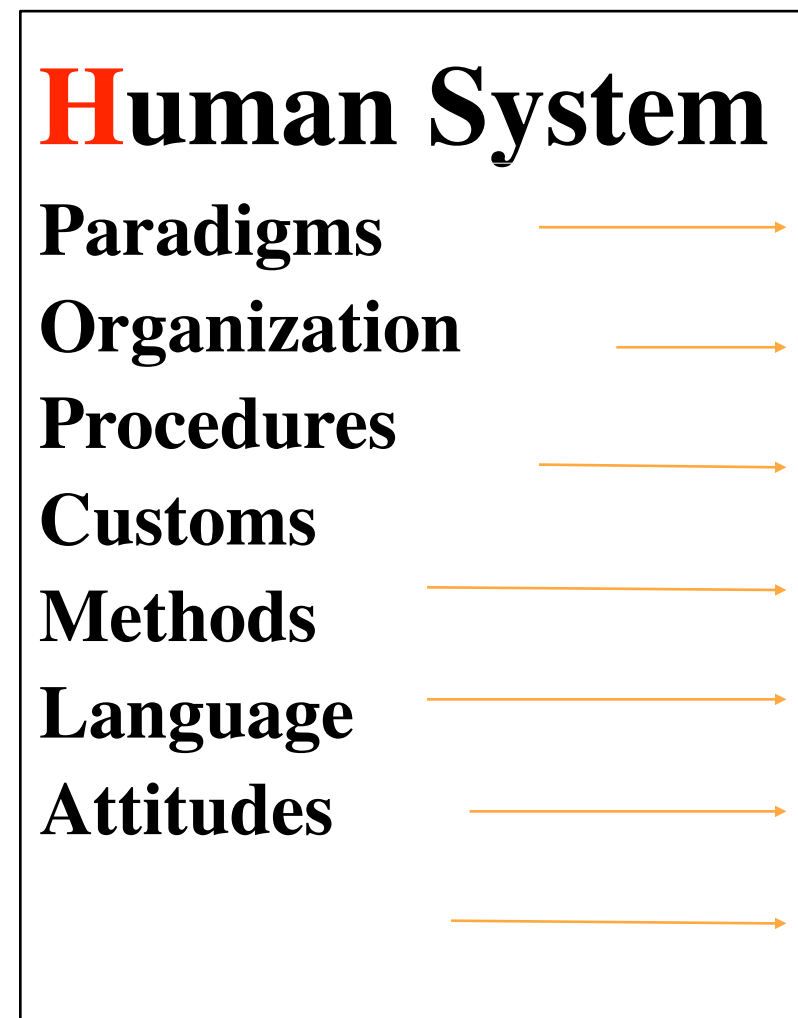


Blogosphere is a social network

By courtesy of Matthew Hurst

Networked Improvement Communities: NIC's

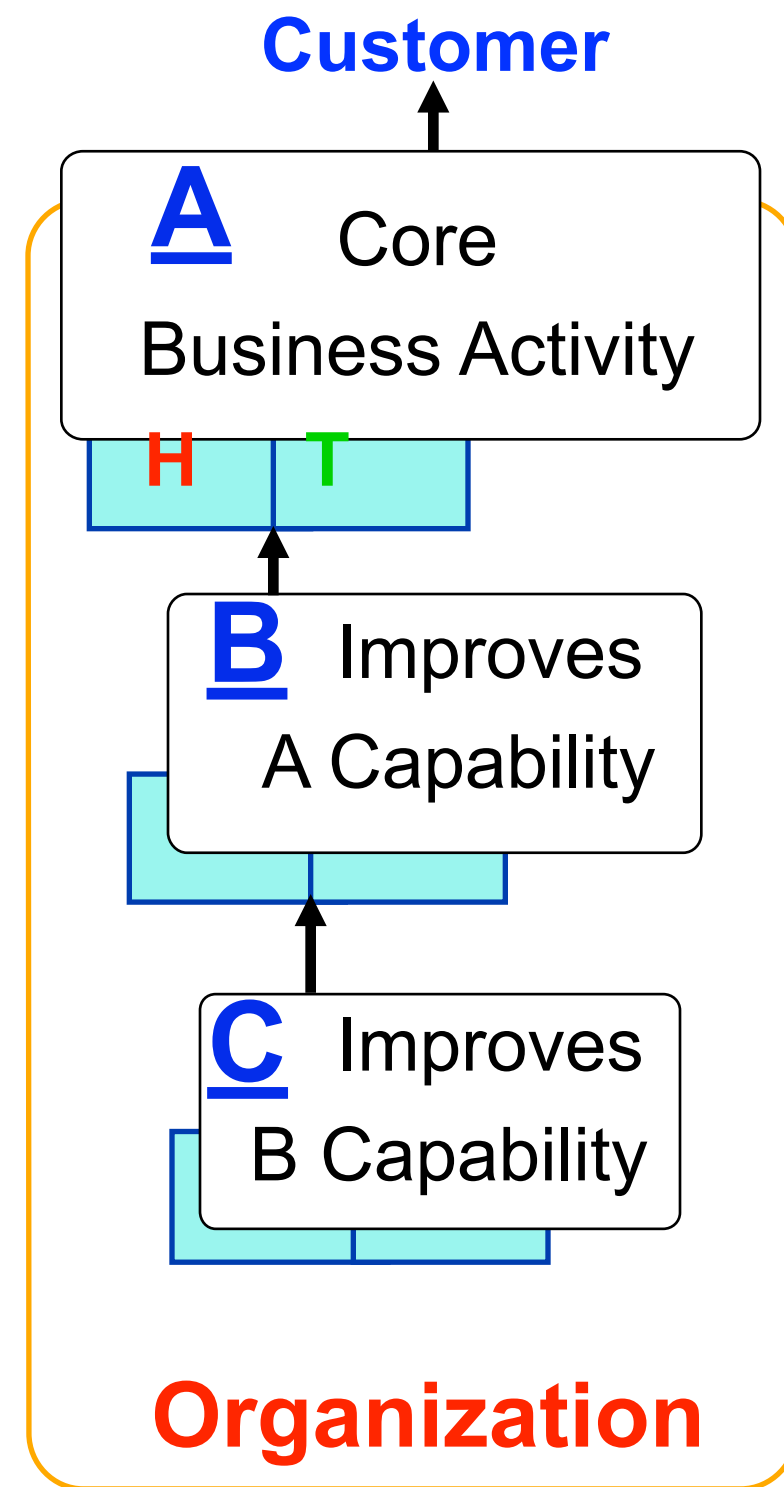
Humans' Capabilities Depend Upon Their Augmentation Systems



This interface is much more significant than “HCI”

Meta approach to Improvement

Agency, NGO, Corporation, Prof. Society, ...

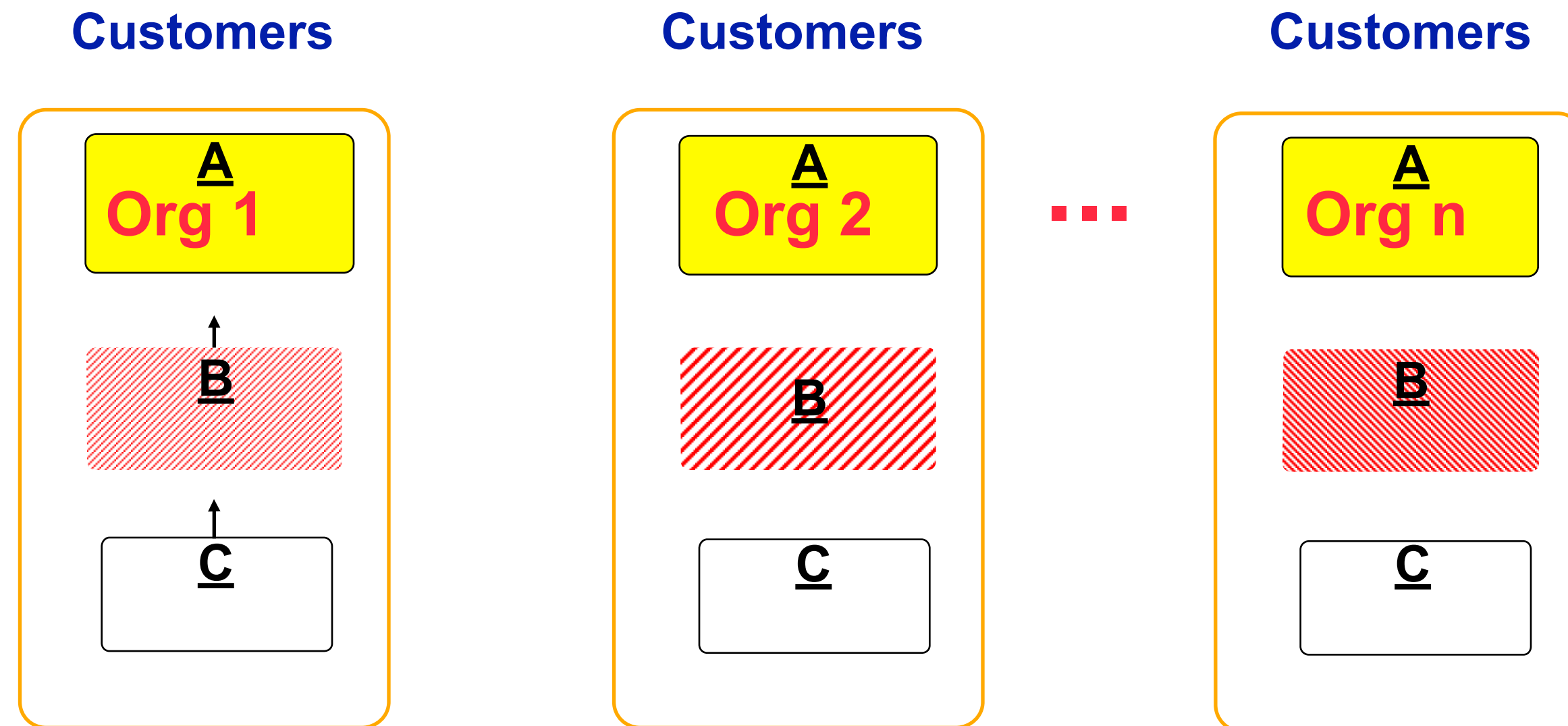


A Activity - **serves** the customer

B Activity - **improves** *product cycle* time and quality

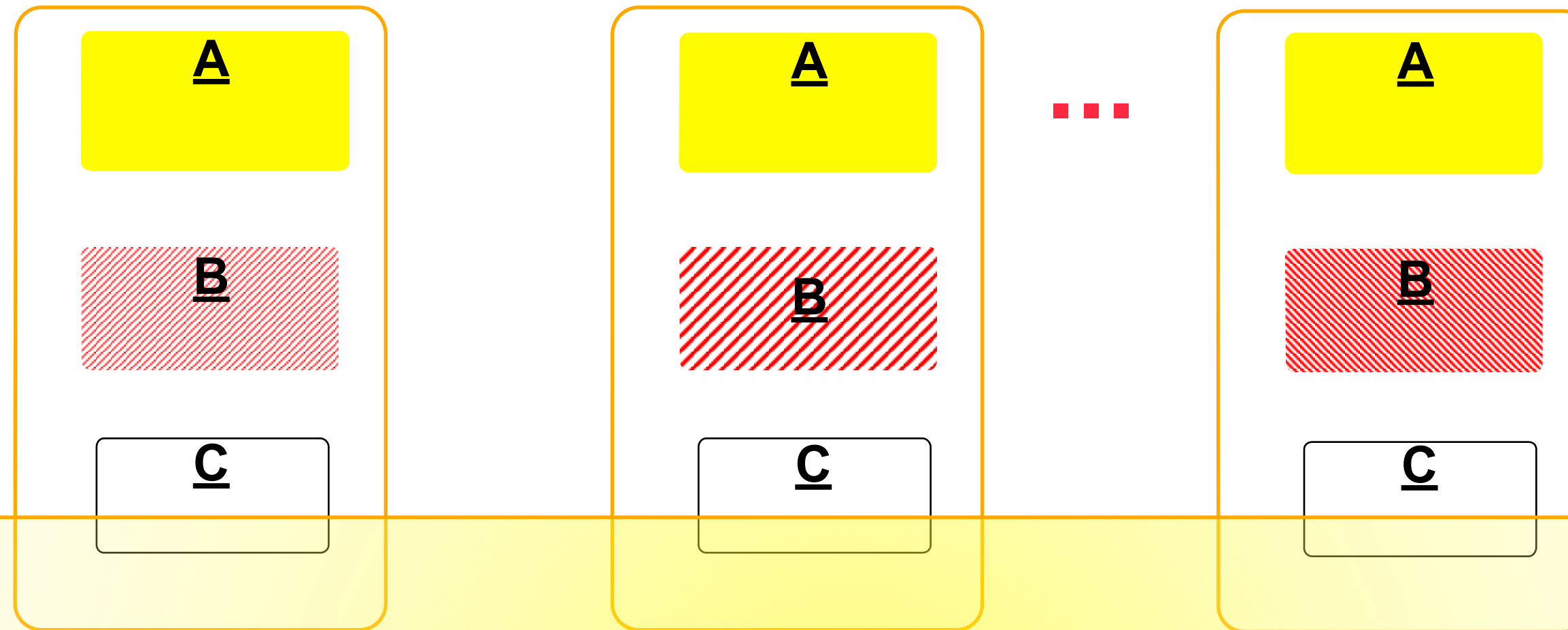
C Activity - **improves** *improvement cycle* time and quality

Identify Common-Interest Organizations



Multiple organizations pool “C-level” expenses to work collectively on common-capability improvements (Consortia; Prof. Societies).

A New Community focused on Improving “C” Activities across organizations

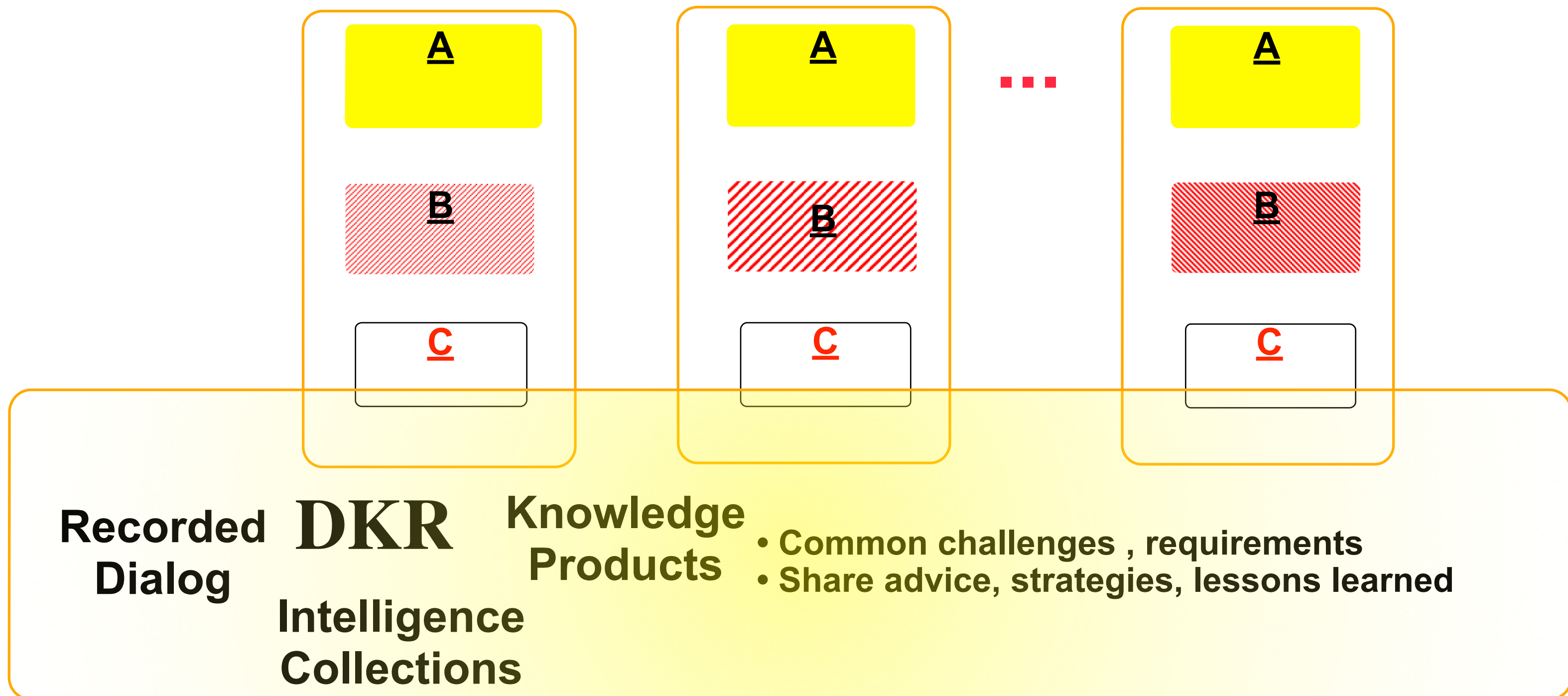


- **Common challenges, issues, requirements**
- **Share advice, strategies, lessons learned**
- **Common types of “Customers” -- their “Bs.”**

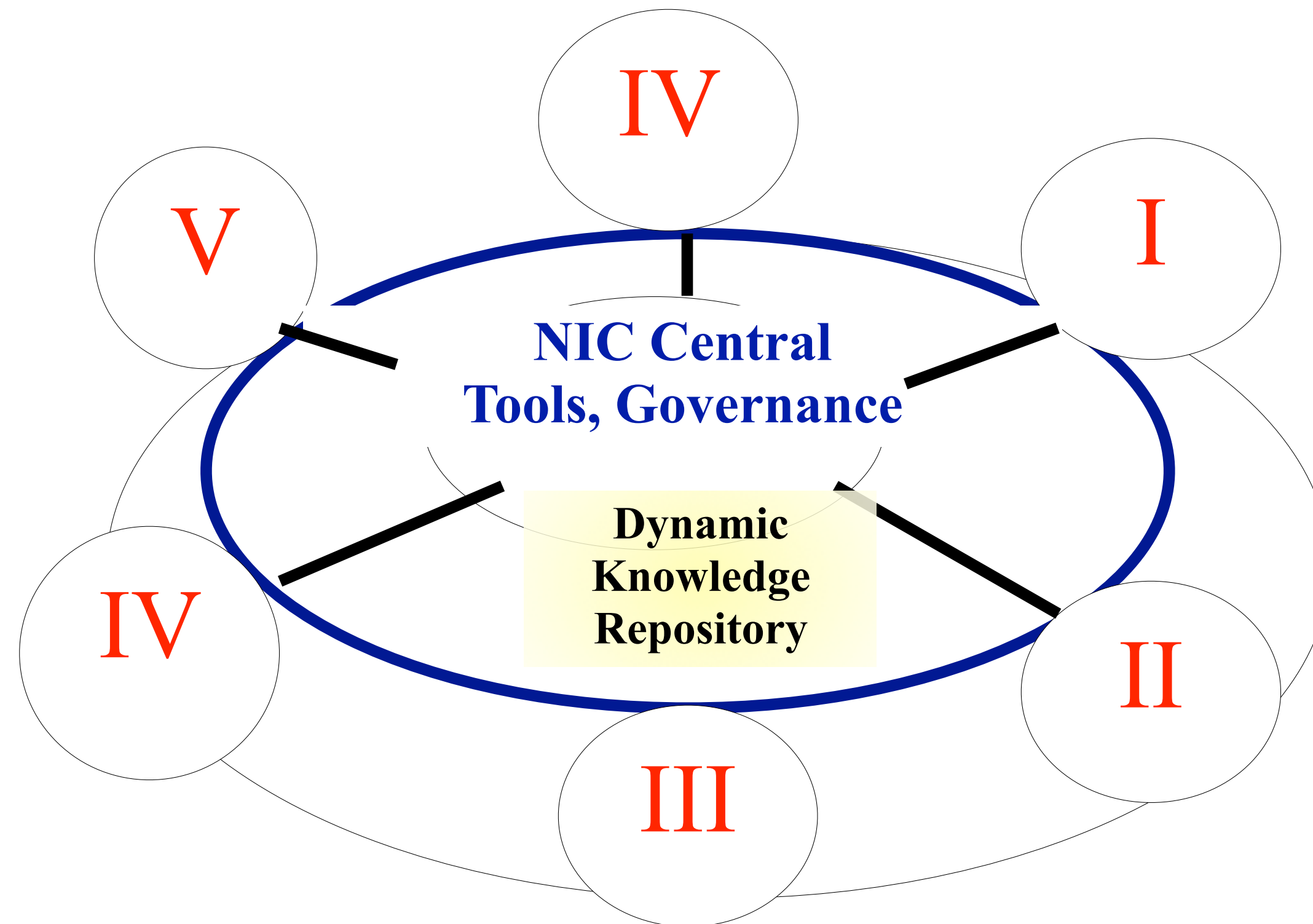
Networked Improvement Community (NIC)

What makes a NIC out of an IC?

- Actively sharing a **Dynamic Knowledge Repository or DKR**
- A DKR provides the best possible understanding of the ways and means for improving the **Improvement capability**.



Networked Improvement Community Of NIC's – Sharing Risk, Pooling Ideas



- Investigate & collect intelligence
- Provide collaborative website
- Rich test bed for experimentation, pilots

Dynamic Knowledge Repositories

The DKR is the integrated knowledge domain providing the current state of the frontier for that domain via dynamic integration of any new data observations, questions, proposals, and challenges that reflect the current state of the frontier.

An appropriately skilled user must be able to follow the reasoning and verifiable data that lead to understanding the updated domain

Discernible argument structure with linked citations to the specific passages that are components of the structure

Helps to determine whether or not to accept the assertion made

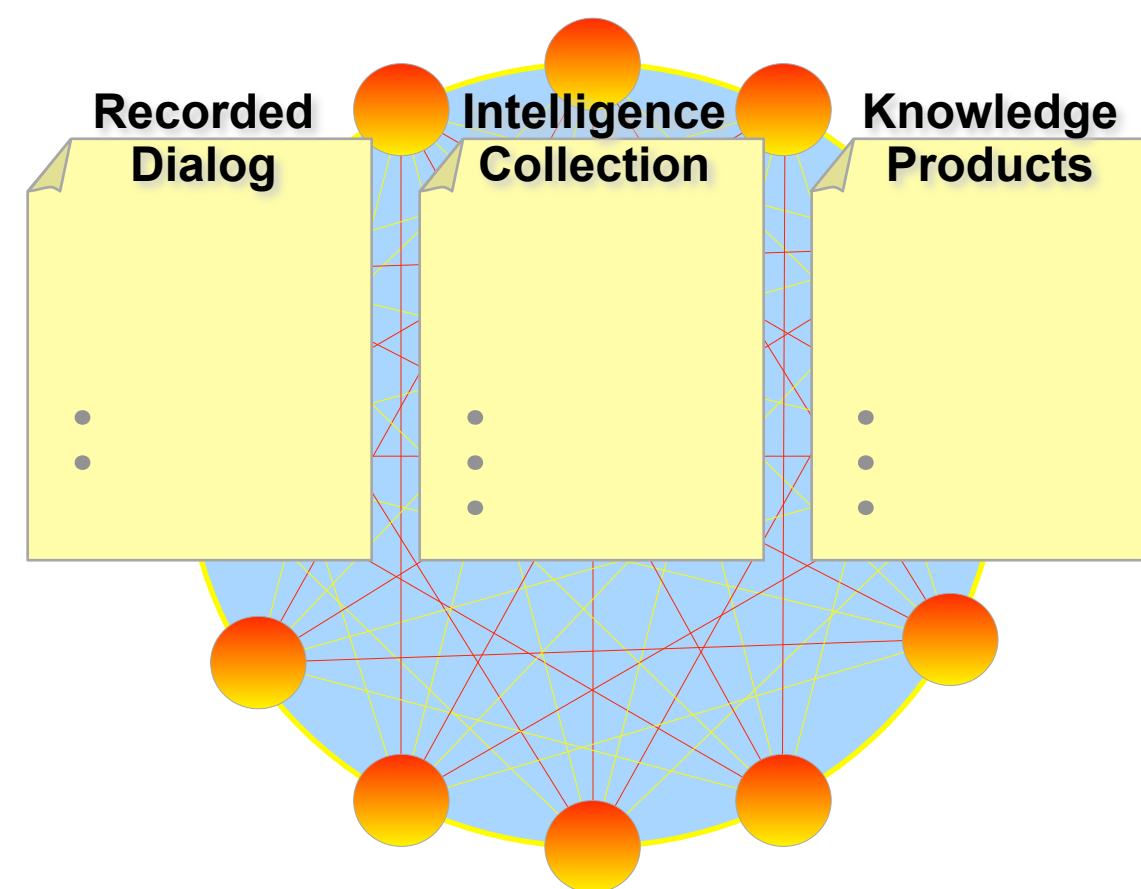
DKR updates might change the direction, future thinking, decisions, etc. for a project

How well does DKR “machinery” support the need to learn about given sub-domains and answer questions

For more on NIC’s and DKR’s see Appendix slides 34-37

CoDIAK

Concurrent Development Integration & Application of Knowledge



The solution is to give high priority to the collective capability for a distributed community to develop, integrate, and apply new knowledge.

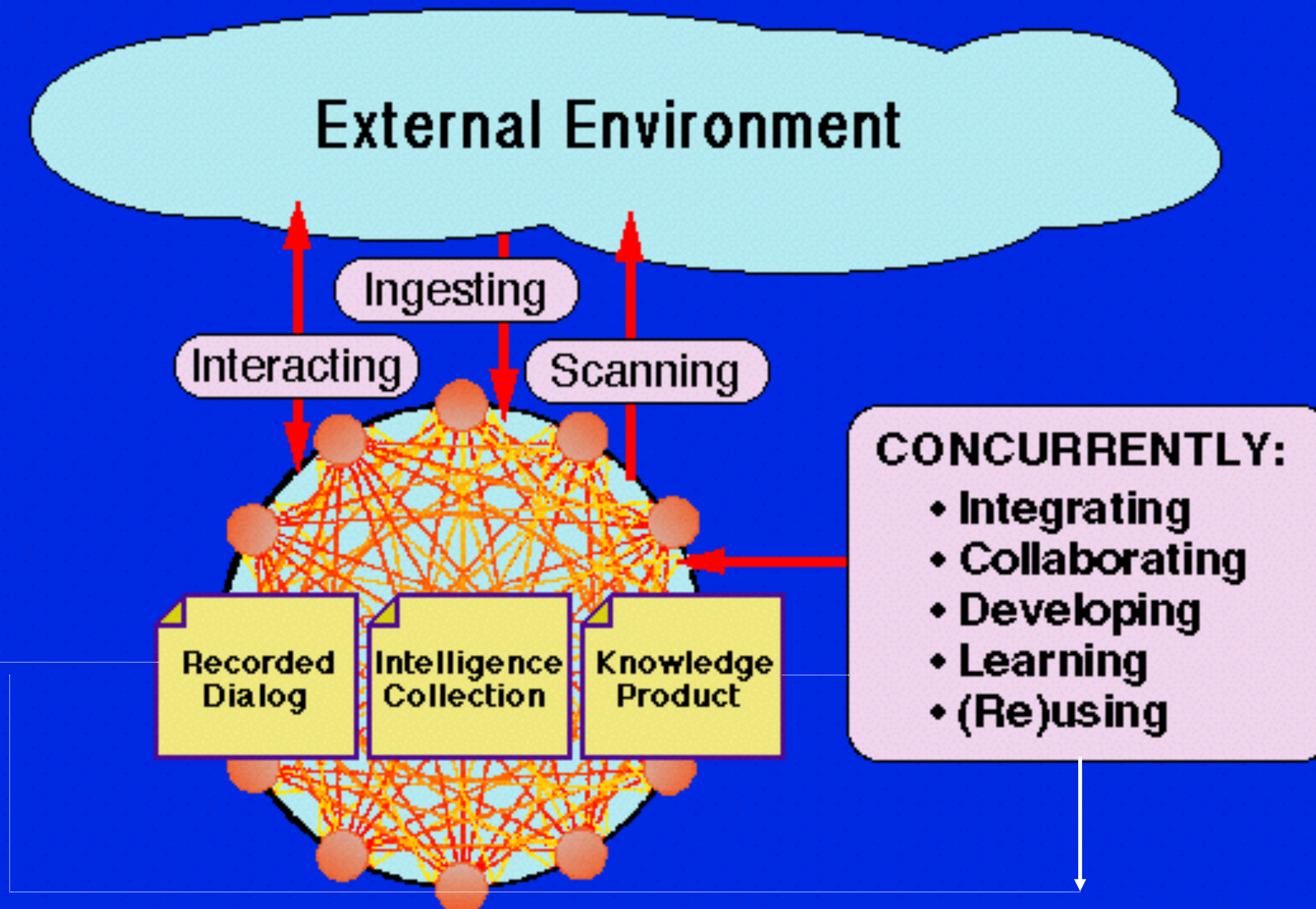
We already had this capability, of course; organizations handle new collective problems all the time.

We could be a lot more effective at it.

In this dream, the collaborative capability is called CoDIAK:

Concurrent Development, Integration, and Application of **Knowledge**.

CoDIAK



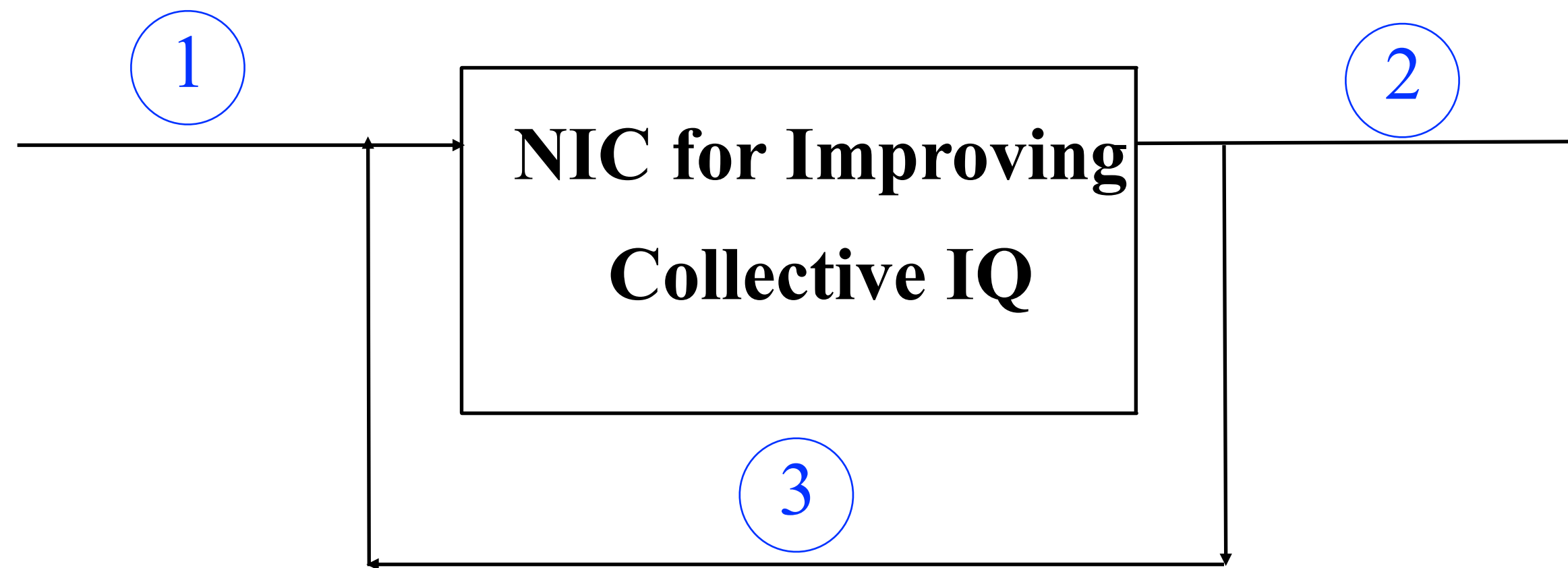
Bootstrapping

The better we get at getting better, the better and faster we'll get better

And just think of the important role for technologists.



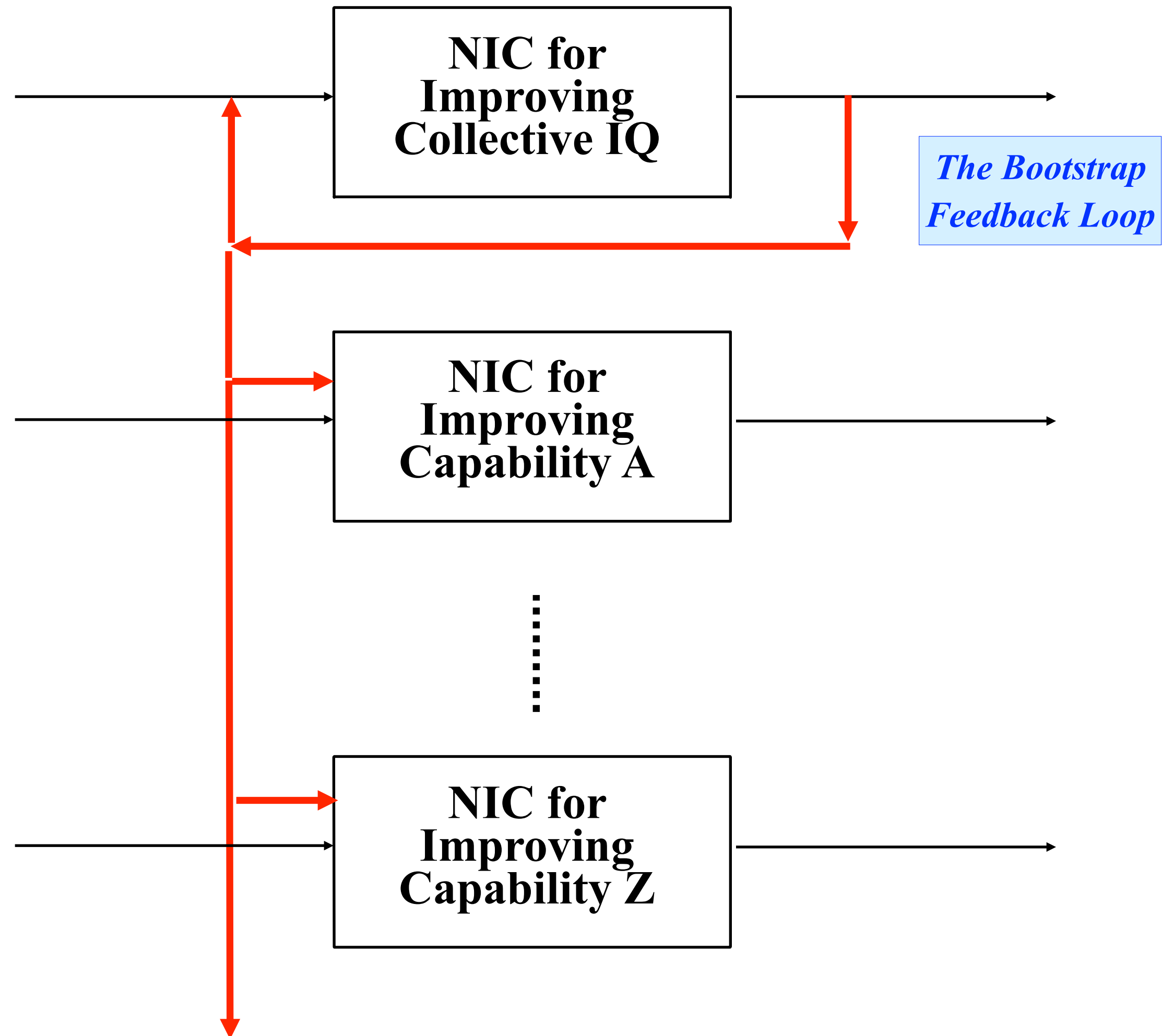
How to Bootstrap Collective IQ



The Bootstrap Feedback Loop

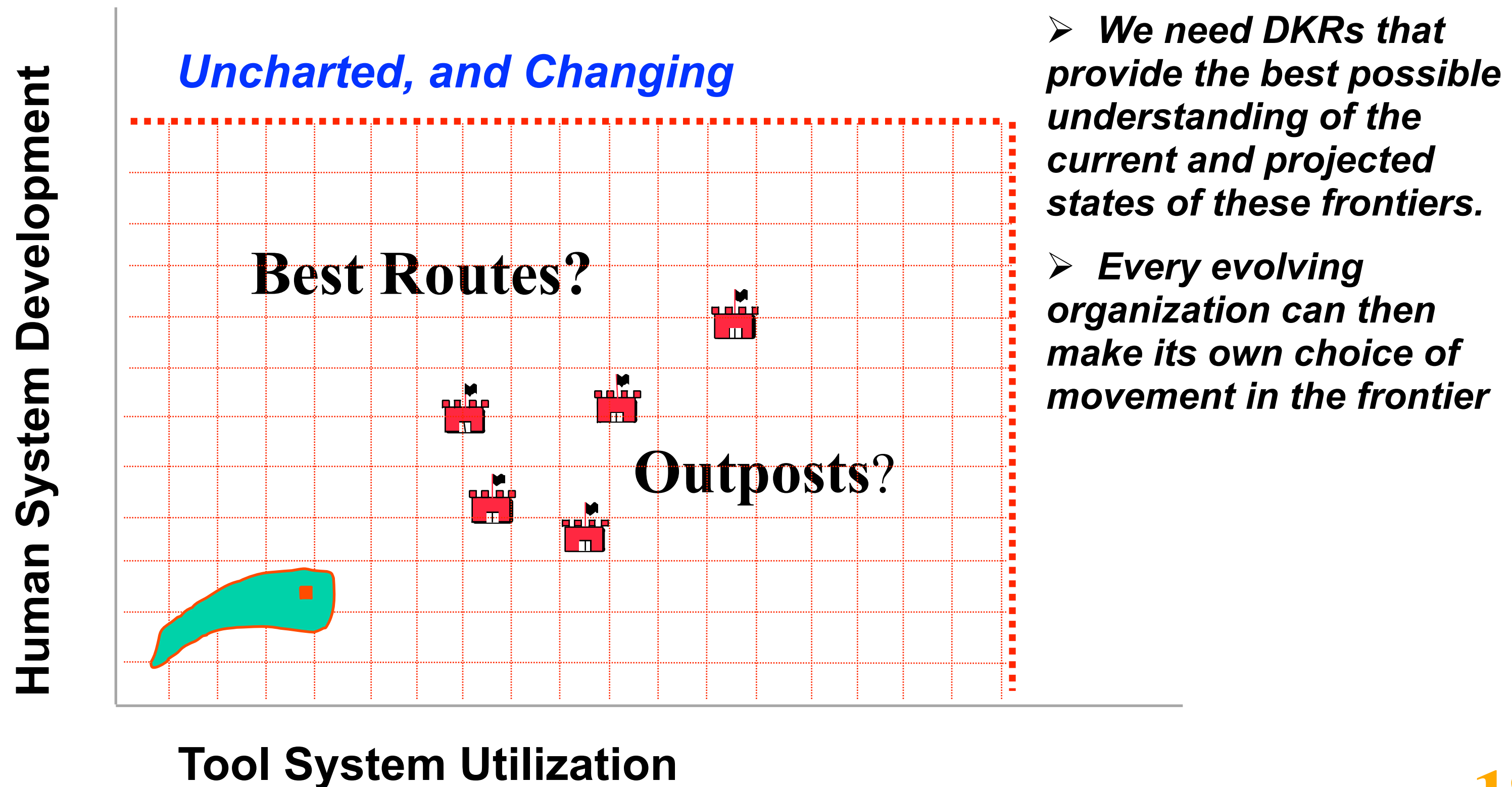
- 1. Currently available information about Collective IQ**
- 2. Best DKR/knowledge about improving Collective IQ**
- 3. NIC immediately utilizing the best Collective IQ improvement knowledge**

Bootstrapping: Extension to Many NICs



Human and Tool System Frontier

***Where should your organization head?
....By what route? Who else is out there?***

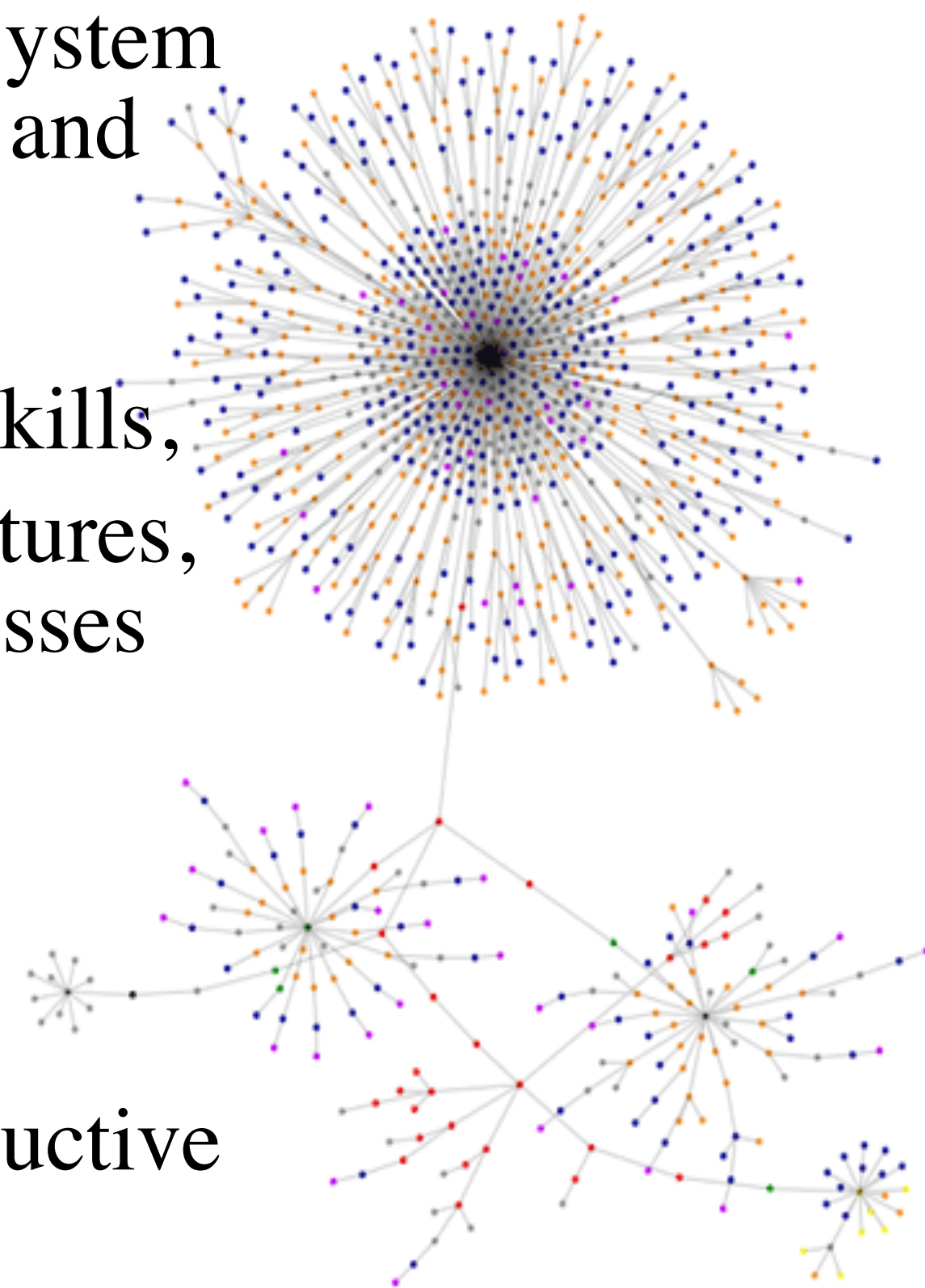


Co-Evolution of Human and Tool Systems

Emphasis on Technology has left Human-System innovation in the dust - seriously neglected and ripe for opportunity

Opportunities abound for developing new skills, collaborative methods, organizational structures, knowledge-worker teams, distributed processes for goal setting, planning and management

Tool options for **view control, types and methods of linking** and **high-resolution addressing** could open up many more productive pathways for Human-Systems



Open Hyperdocument

We must **shed** our outdated concept of a “document” and **examine** what we want

We need to **think** in terms of flexible jumping and viewing options.

The objects assembled into a document **should be dealt** with explicitly as

- representations of kernel concepts in the authors' minds,

- explicit structuring options **have to be utilized** to provide a much enhanced mapping of the source concept structures.

www.isoc.org/inet2000/cdproceedings/6d/6d_1.htm

1. Terms

2. Definitions

3. Explanations

4a. Authors

4b. Titles

5. Partial Contents

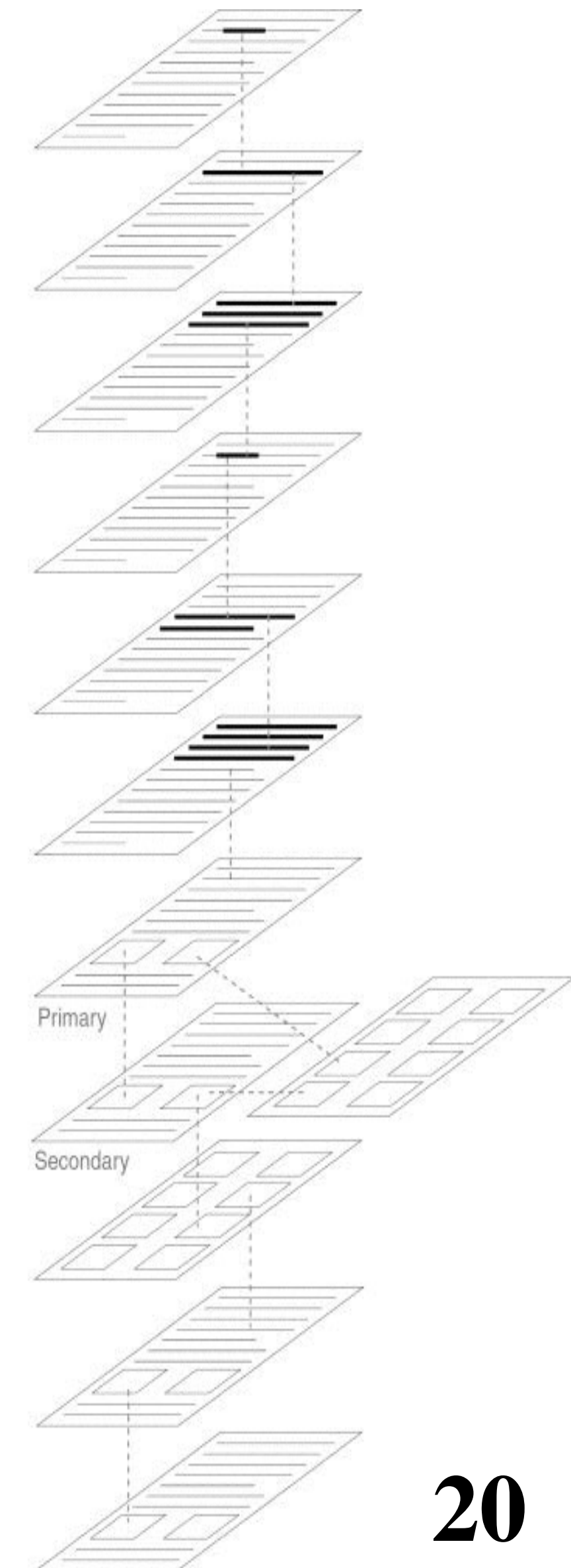
6. Full Contents

7. Internal Analysis

8. External Analysis

9. Restorations

10. Reconstructions



The Open Hyperdocument System



Open Hyperdocument System (OHS)

Supports the implementation and use of DKRs & the way we want to work

“Open” - Scalable, evolvable, interoperable across domains

“Hyper” - To enhance access, maneuverability, and (re)utilization

“Document” - To capture, integrate, and manage the emerging heterogeneous knowledge

“System” - Provides a complete “knowledge workshop”

Key Launching Step in Creating a NIC's “Knowledge Workshop”

- Co-evolve from NIC's own starting point (legacy technologies, systems, cultures)
- Provide a direct useful entry step for the first stage of the human/tool co-evolution

Bootstrap Project - OHS

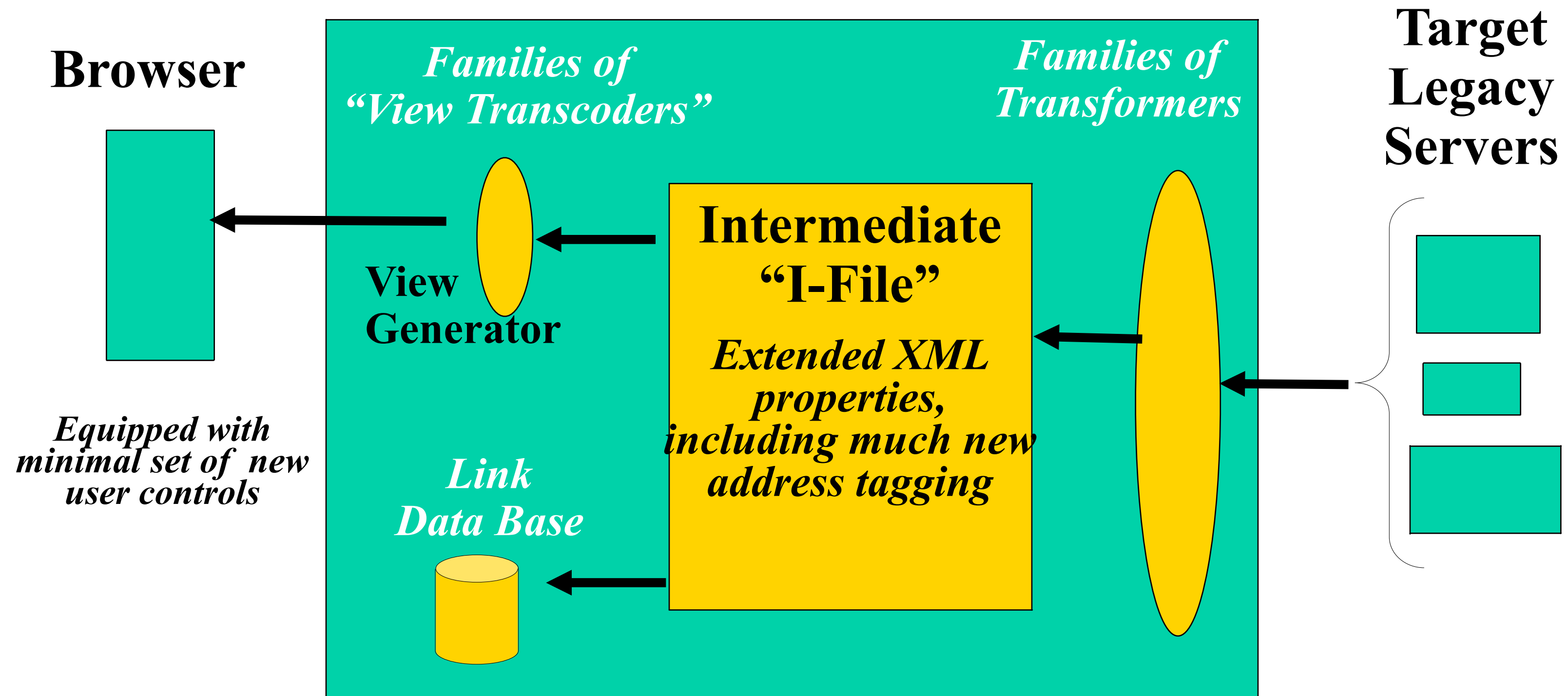
- Develop framework for hyperdocument architecture
- Develop framework for the functional tool systems

HyperScope is the smoothest first step, providing the least disruptive, best evolutionary potential

Stage 1: OHS-HyperScope Browsing

Over a wide variety of legacy files

- *High-resolution linking*
- *Many viewing options*



And also, hi-resolution linking to audio, video ...

“Optional views” in “Hypertext”

.....in the sense that Vannevar Bush’s Memex enabled
”jumping” to other photo-captured frames

Suppose we provide for our computer to re-shape, re-color, re-
arrange, etc., our stored information ...

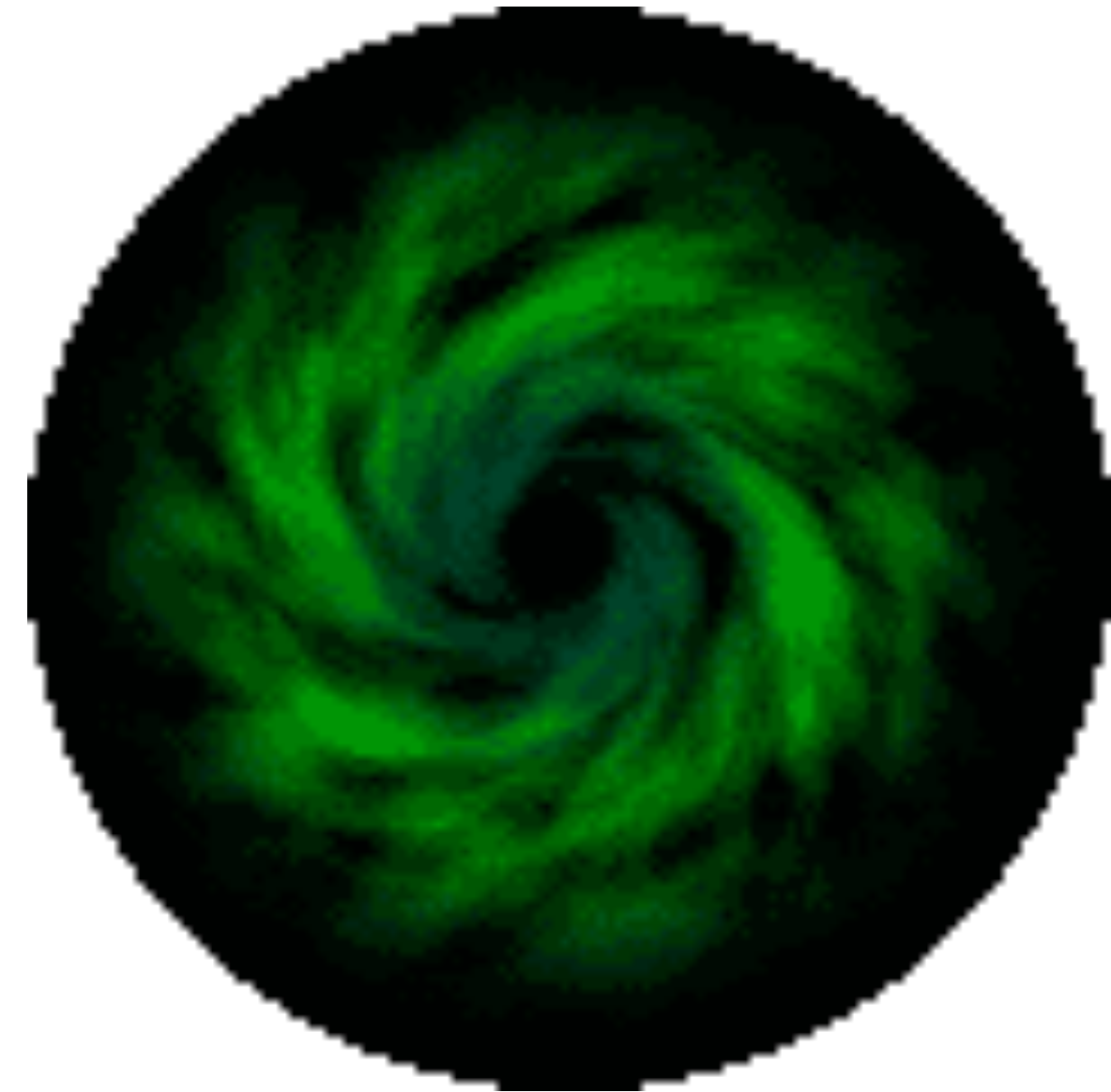
... on the fly, with quick option-actions,

... portraying content in ways that help the human’s
perceptual machinery better grasp the concepts and their
relationships.

See examples in Appendix Slides 38 -52

The “Link Data Base”

- Can directly support full-scale “**Argument Structuring**” and its graphic portrayal.
- Including “**Issue-based Information Systems**” (IBIS), tracking the evolution/resolution of issue-oriented dialog
- Records by which back-tracking can determine:
 - “Attribution” for helpful ideas or assessments
 - Isolate bad ideas or problem assessments that steered an issue off target.
- Support more carefully * **scrutinized** * analysis and judgements



What is in the Link Database ?

For every HyperScope link that was actuated into a given I-File, the Link Database will record:

- the target object
- the high-resolution location of the link in its “home file”
- the “link-type designation” embedded in the link syntax (whose significant usage will be part of the new working conventions of HyperScope users)
- for some link types, also: optionally viewed “content” -- e.g. comments about the targeted object, or highlighting of objects on the targeted document, or even one or more useable links which the reader can exercise

Evolve towards a Full-Scale Open Hyperdocument System

Start with the HyperScope

Extend viewing and linking options

Add optional User Interface systems – pursuing range from “Pedestrian Users” to highly trained, top-capability “Expert Users.”

Steady extension of functional utility and corresponding file properties

Aim toward most effective development and maintenance of DKRs, for an increasing array of important knowledge domains.

The Web/HTML publishing-browsing landslide has moved steadily toward a highly structured, object-oriented architecture with integrated editor-browser tool sets.

This is NOT the way the majority of people do all their work.

Draft notes, E-mail, plans, source code, to-do lists, **what have you-** all can be hyperdocument pieces

Instantly and intrinsically linkable, and with work processes involving fewer and fewer hard-copy printouts.



Neats vs Scruffies





It has been exciting to watch the emergence of the World Wide Web

But it pains me that we haven't yet put up an explicit CoDIAK target, nor explored how NICs could fly.

Since the first of these dreams got fixed in my head, decades ago, I'm struck with the realization that **the sooner the world gets serious about pursuing the possibilities**, the greater the chance that we will have to steer the vehicle we are in, to places that better for humankind

If the dream of improving human destiny isn't enough, how about the thought that the companies that adopt the best CoDIAK-improvement strategy will have a significant competitive advantage.

Wouldn't you want your group to have the highest collective IQ?



Someone once called me "just a dreamer."

That offended me, the "just" part;

being a real dreamer is hard work.

It really gets hard when you start believing in your dreams.



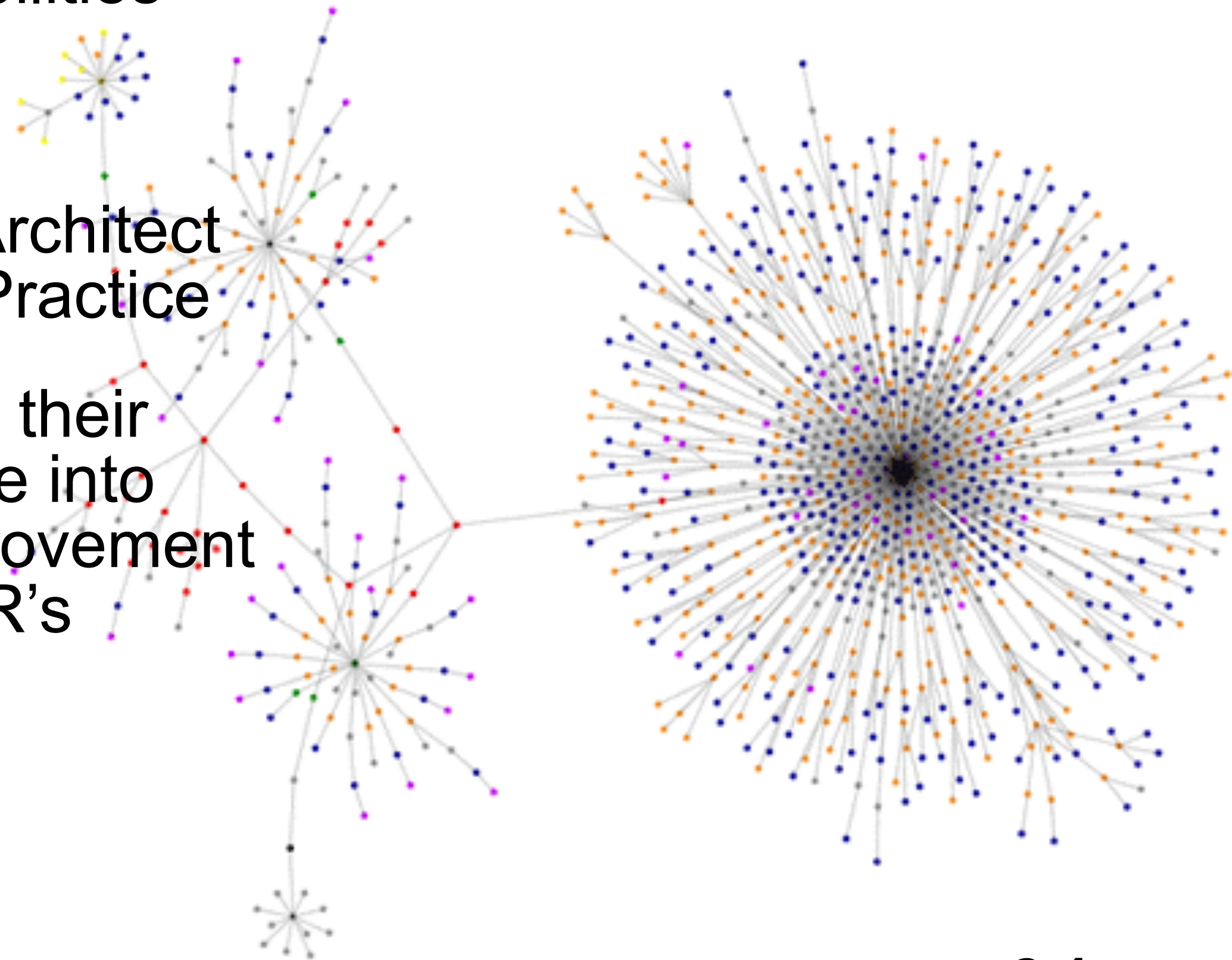
Appendix

Selected Reference Links

- Subset of Engelbart papers that are on the Web:
<http://www.bootstrap.org/institute/bibliography.html>
- – Special interest in Items below:
- #3: Augmenting Human Intellect: A Conceptual Framework. Douglas C. Engelbart. 1962.
- #29: Toward High-Performance Organizations: A Strategic Role for Groupware. Douglas C. Engelbart. 1992.
- #32: A Draft OHS-Project Plan (The HyperScope) Douglas C. Engelbart. 2000

Cultivate Special Knowledge-Work Capability- Development Roles

1. Start building KW capabilities using the HyperScope
2. Actively develop role of Knowledge Workshop Architect within Communities of Practice
3. Emphasize their turning their Communities-of-Practice into NICs -- Networked Improvement Communities using DKR's



Getting Started

Study organizations whose challenges are to improve their capability to cope with complex challenges

How have they organized the knowledge they need to understand best those challenges?

Look for examples of candidate DKRs associated with those domains.

- Body of knowledge associated with domain, e.g. “handbook” or “encyclopedic” concept
- Provides the means for skilled participants to use knowledge domain
- Integrated knowledge, not just a list of sources

Key, Central Activity: Learning how to build better DKRs

So why not get a bunch of different university groups building prototype DKRs for selected knowledge domains?

In different departments – domains relevant to their study areas ...

In different universities – OK (preferable) to focus on same domains as other universities.

Each university has one special domain: A DKR about DKR development -- to facilitate the learning process about how better to develop and learn from DKRs.

Challenges for DKR Development & Use: Rationale for Building a DKR of DKR's

- Special sets of skills required for increased capabilities
 - Who will provide the integration & linking of disparate information into the solid, verifiable DKR structures
- Properties & structural principles for DKR knowledge containers will be critical part of DKR evolution
- Dynamic, seamless integration of new data while preserving the DKR's evolutionary history
- Assessment and rating of the organization's capabilities to develop and use its DKRs
- Capability Infrastructure – support a wide range of usage capabilities, e.g. multiple user interfaces that reflect increasing levels of user expertise

Example: “EXPERT-User” AUGMENT Command Verbs for the BASE subsystem (Text & File Manipulation)

- *Act Append Break *Check *Clear *COMment
*CONnect Copy *Create Delete *DETACH
*ENlarge EXECUTE *EXPunge Force *FReeze
Goto Help Insert Jump Logout Move *Point
Print *PROcess Quit *REName Replace
*RESet *REVerse *SEt *SHow Sort *STArt
*STOp *THaw Transpose *TRIm *TYpe
*UNdelete Update
- NOTE: Type the Cap-noted letters (start with
SPACE for the “*” terms) and the system will
recognize the abbreviation and pop up the full-term
command line.

Example: “EXPERT-User” AUGMENT
Command Nouns for the BASE subsystem (Text
& File Manipulation)

- Nouns: Branch Character *DIRective
Directory File Group Invisible Link
Number *Phrase Plex Statement Text
Visible Word
- Type Chars:
dw
mb
jl
- Command Line:
Delete Word
Move Branch
Jump Link

Powerful “Macro Commands” significantly extend the power of the AUGMENT user.

- Setting them up becomes quite simple – writing them utilizing the same “Command Language” and the same highly flexible and explicit addressing.
- E.g., evoke this one with four-char call, give it the initials for friend Joe, and it compiles the content filter which will show me all of Joe’s email that I’ve stored in a given file domain.

High-resolution addressability – Basic NLS feature from mid-60s

- Initial purpose, so that one could use a link to cite ANY OBJECT in ANY FILE.
- Then an increasingly flexible and powerful addressing scheme evolved.
- “Open Jumps” began to be supported – e.g., a user can type `Jump Item ph,JS.I` which leads to his phone-directory file, then to the node labeled “JS” (for Jim Smith) where there is a simple link leading to the Jim Smith entry.

Lower-Case-Letter Viewspecs

- a: show one level less
- b: show one level more
- c: show all levels
- d: show first level only
- e: show levels down to reference stat...
- f: recreate window if necessary
- g: show branch only
- h: show all branches
- i: filter statements
- j: don't filter statements
- k: show next filtered statement
- l: show plex only
- m: show statement numbers/SIDs

Upper-Case-Letter Viewspecs

- A: show level indenting
- B: don't show level indenting
- C: show statement names
- D: don't show statement names
- E: paginate when printing
- F: no paging; recreate display (display)
- G: statement numbers/SIDs right
- H: statement numbers/SIDs left
- I: show SIDs, not statement numbers
- J: show statement numbers, not SIDs
- K: show statement signatures
- L: don't show statement signatures
- O: user sequence generator on
- P: user sequence generator off

Some things we learned from twenty-five years', active-use evolution of the NLS-AUGMENT System

Prime objective was “Capability,” with a UIS that provided effective evolutionary learning for what steadily extended as a natural-language vocabulary.

Enter a minimum string of characters for each the verb and then the noun – and the system recognizes the intent and automatically fills out the whole-word command expression. So the user knows she has established a well-formed command.

Comparative use of Pub #32

- ... From this Pubs listing: <http://www.bootstrap.org/institute/bibliography.html>
- ... Let's use the following publication for a brief demo of what HyperScope would do:
- #32: A Draft OHS-Project Plan, Douglas C. Engelbart, 2000: <http://www.bootstrap.org/augdocs/bi-2120.html>

Sample Views: The HyperScope File <<http://www.bootstrap.org/augdocs/bi2120.html>>

INTRODUCTION

Large-scale challenges are best served if there are appropriately scaled strategic principles to guide their pursuit. And special value results if the launch plan of a long-term and large-scale strategy produces significant payoff accrual early in the pursuit.

We are addressing the large-scale, pervasive challenge of improving the collective development and application of knowledge. Many years of focussed experience and conceptual development underly the strategic framework guiding this proposal.

Phase-1, OHS Launch Project: HyperScope

Show just paragraphs' first lines

INTRODUCTION

Large-scale challenges are best served if

We are addressing the large-scale,

Phase-1, OHS Launch Project:

Special Note: Implementation of the

The HyperScope will be a lightly modified

A Hyperscope user will be able to follow

Brief Functional Description of Phase-1

Now don't show blanks between lines

INTRODUCTION

Large-scale challenges are

We are addressing the large-scale,
Phase-1, OHS Launch Project: HyperScope

Special Note: Implementation of the

The HyperScope will be a lightly modified

A HyperScope user will be able to follow
Brief Functional Description of Phase-1

1. In response to what may be an ordinary

For any community seriously interested

2. High-Resolution Addressability:

E.g., here "<http://xxx.xxx.xxx#aaa>"

3. View-Specifications: The HyperScope

Show only the first two levels

INTRODUCTION

Large-scale challenges are

We are addressing the large-scale,
Phase-1, OHS Launch Project:

Special Note: Implementation of the

The HyperScope will be a lightly modified

Brief Functional Description of Phase-1 Phase-2:

Maturing/Evolving the

Evolution of the Intermediary File format

An OHS "User Interface System" (UIS)

Provision for archiving, version control,

Now the VERY important feature of this

And the critical community-development

For the scale of utilization that will be

Show one-line, next-level content of “Brief functional description”

Brief Functional Description of Phase-1

1. In response to what may be an
2. High-Resolution Addressability:
3. View-Specifications: The HyperScope
4. Expanded set of HyperScope
5. Copying-Pasting HyperScope Links:
6. Back-Link Management: Provision will
7. Extended addressing conventions to
8. Same file in multiple windows -- no

Now show only the first level

INTRODUCTION

Phase-1, OHS Launch Project:

Phase-2: Maturing/Evolving the

Phase-3: Special Evolutionary Provision:

Show all lines of top-level statements, with
blanks between them.

INTRODUCTION

Phase-1, OHS Launch Project: HyperScope
enhancement of Legacy Systems:

Phase-2: Maturing/Evolving the

Phase-3: Special Evolutionary Provision:

THANKS