Advanced Process Architectures

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Instructor's Background

- B.Sc. in Sociology and East Asian Studies (U. Kansas)
  - Not an Engineer, but Social Science background
- Ph.D. in Sociology / Philosophy of Science (London U.)
  - Spent eight years doing research into structure of theoretical systems
- Thirteen years Software Industrial Experience
  - Systems Analyst, Software Engineer, Technologist
- Five years Process Improvement Experience
  - SEPG chair and member
- Research in Practice (Action Research) Approach
  - Process improvement is a form of *sociological practice*
  - Process improvement has its own intellectual challenges
  - It is possible to do research and practice together effectively

Questions and Answers

- There is a lot of material to get through
- Questions need to be limited to clarifications
  - If you do not understand, please speak up
  - If clarifications begin to take too much time, we will have to continue them off line.
- Questions that call for expansion on points should be withheld
  - Note the part of the briefing, number of slide and question
  - Subscribe to tutorial Email List
    - Send the message "SUB TUTORIAL" to listserv@think.net
    - Post your question to the list
- Systems Engineering and Software Engineering lists exist there
    - Send the message HELP to listserv@think.net to get more information

Expectations

- This course contains Advanced Material; it is not Basic
  - A graduate level course
  - Targeted at experienced Process Improvement practitioners
- Theoretical, not Practical
  - No practical solutions will be offered
  - Instead this course will seek to expand the audience's horizons
  - Will consider alternative viewpoints on Process
- Pushing the state of the art
  - Will attempt to look into the future of the application of Processes to work organization
  - Will bring to bear advanced concepts from other disciplines
- Wild ideas
  - Meant to suggest new ways of thinking
  - Meant to be a starting point for your own explorations of these issues
- Architecting; not a history of architectures
  - Presents fundamental principles that form a basis for designing a process architectonic; not a survey of existing architectures

Schedule

- Section One:
  - Part One
  - Part Two
- Break:
- Section Two:
  - Part Three
  - Part Four

- Symbol for extra slides not to be presented

This briefing is dedicated to my father, Alfred L. Palmer, who did Office Systems Analysis as a profession for many years and was twice President of the Kansas City Chapter of the Systems and Procedures Association circa 1965. Who would have guessed I would end up studying work also.

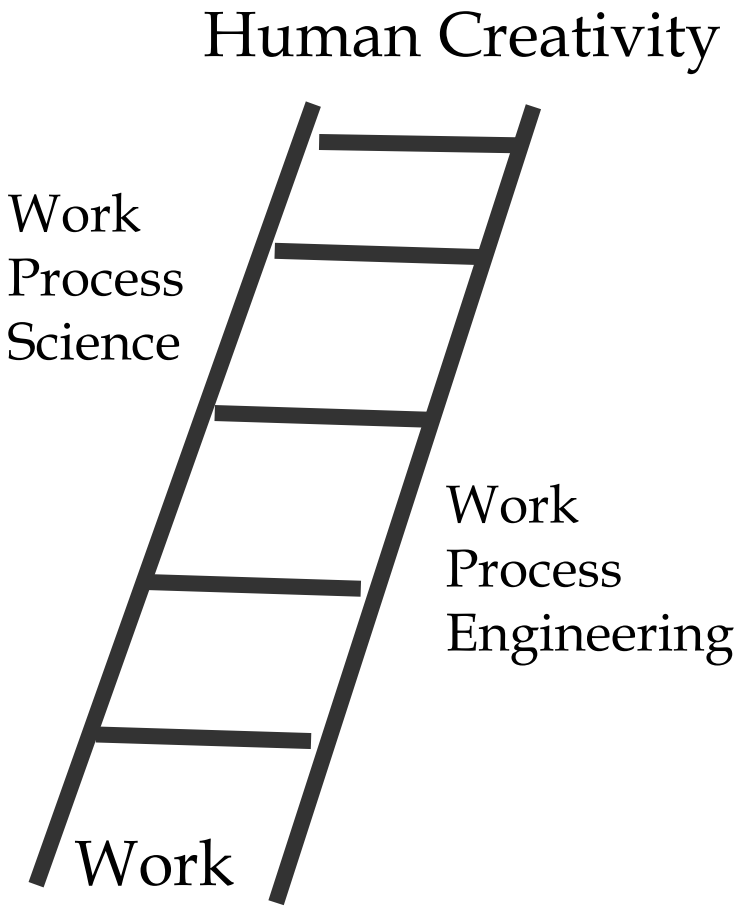
Overview

- Part One: Work Process Engineering, Science and Creativity
- Part Two: Exploring the Nature of Work and Play
- Part Three: Advanced Process Architectures
- Part Four: The Future of Process Architecture

PART ONE

Work Process Engineering, Science and Creativity

Ladder



- To establish a framework for speaking about process we will climb this ladder

Process Improvement

- Many names for the same thing in each discipline
  - Software Engineering Process Improvement
  - Systems Engineering Process Improvement
  - Customer Acquisition Process Improvement
  - Human Resources Process Improvement
- Need a more general term to describe Process Improvement activities
  - Work -- generically each discipline is a kind of work
  - Process -- denotes the view of work which concentrates on what was done and how, and not on the products themselves
  - Engineering -- essentially we are applying engineering concepts to structuring work in a particular engineering discipline
- Engineering is a more general term than Improvement
  - We want to do more than improve
  - Engineering implies a systematic approach to improvement

Work Process Engineering

- Not tied to a specific discipline
  - Started in software, but spreading to other disciplines
- Generally practical and not academic
  - Has grown up in industry as a response to customer initiatives
  - Becoming more academic as schools discover process education opportunities
- Focuses on how things are accomplished, not end result
  - Assumes that improving how things are done will affect end result
- Focuses on intensive, highly technical, expert labor
  - Not manual labor or office work
  - This is not Industrial Engineering
    - Industrial Engineering is focused on production efficiency
  - This is not Systems and Procedures Analysis
    - S&PA is focused mostly on office systems.

Work Process Engineering

- Multiple Intersecting Disciplines
  - Technical Disciplines
  - Social Sciences
  - Economics
  - Managerial
  - Organizational
- Normally practiced by people with technical competence in the engineering discipline, but who were not trained in many of the intersecting domains
- Related to Business Process Re-engineering
  - Many companies are focusing on processes as a means of restructuring their business
  - Tends to be revolutionary, instead of evolutionary
- Has broad applicability throughout industry

Focus Areas for Work Process Engineering

- Process Architectural Design
- Process Description
- Training
- Enactment Facilitation
- Self-Assessment
- Evaluation Support
- Process Improvement
- Metrics Evaluation
- Assets Management
- Methods Research
- Technology Tracking

The Design of the Process Architecture should be the very first focus of the improvement effort.

Normally little thought goes into the design of the process architecture, but the robustness of that design is crucial to the success of the process engineering efforts.

Improvement Cycle Sequence

- Promote need for Process (Initial Assessment)
- Design Process
- Describe Process
- Deploy Process Description (Training)
- Enactment of Process within Organization
- Monitor Process Effectiveness
- Ongoing Activities
  - Process Assets Library Development
  - Metrics System Development
  - Technological Infusion
  - Continuous Improvement

Some Typical Problems

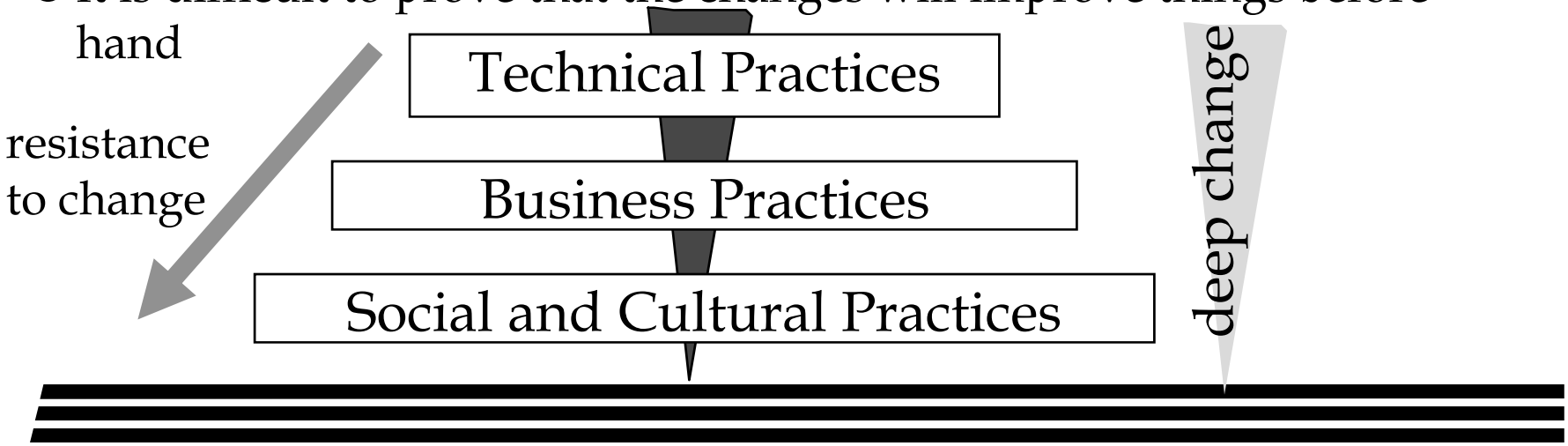
- Process Design is found to be inadequate
  - Must be constantly changed to accommodate many unexpected factors
  - Lack of flexibility for instantiation
- It is difficult to describe work processes so that they can be enacted by practitioners
  - Idealization
    - Describe best practices, not state of the practice
  - Abstraction
    - Cannot be concrete if they must cover different kinds of projects
  - Interpretation
    - What is expected by auditing agencies not close to actual practices "on the ground"
  - Disconnection
    - What is in process description is not what is on practitioner's minds

More Typical Problems

- It is difficult to get political and thus financial support
  - Process is seen as a side issue -- Product is all important
    - The major premise of process improvement is not accepted
  - Process concern is forced on us from the outside in many cases
    - We will do it to the extent we see . . .
      - the customer actually using evaluations
      - how it affects our business.
  - Process forces us to change
    - Technology transfer is difficult
    - Process is a human technology and so its transfer is even more difficult
    - Change takes a long time, and quick attempts to change direction usually fail to be sustained
    - Process is really a completely new way to do business
      - Re-engineering our business practices

Even More Typical Problems

- It is difficult to change social practices , tradition, culture, etc.
  - Technology and business practices are superficial obstacles to change as compared to social and cultural practices
  - People do not like to change social practices because that means changing social relations
  - People have their own ideas of what is right
  - Changes initiated from the outside are automatically resisted
  - It is difficult to prove that the changes will improve things before hand



Result

- Frustration
  - Process developers create processes that sit on the shelf
  - Practitioners are forced to do things they see as irrelevant
  - Management fails to give critical support
- Disconnection
  - Process developers are seen as outsiders, and their role is ignored
  - Practitioners pay little or no attention to process developers
  - Management does not have goals for process improvement
- Facade
  - Process developers fight fires prior to assessments and evaluations
  - Practitioners are coached on what to say when they are “trained”
  - Management wants a rating without having to make actual changes

When things go well . . .

- Management really believes in and backs process improvement efforts
  - Management communicates this goal throughout the management levels
  - The cost of bringing the appearance of maturity into line with reality is gladly borne
  - The organization as a whole believes in the connection between process and product quality
  - The discrepancy between the description and the enactment is reduced
- The process group has active champions that are well respected in the organization
- Practitioners see the changes they are interested in made
- Actual changes may occur beyond the spotlight of pilot programs
- Both management and practitioners are involved in planning and implementing change together

When things do not go well . . .

- Process improvement is labeled another business fad
- The customer does not really display a proactive use of process related evaluations in procurement
- Management only allocates enough funds for a token effort
- The process group becomes a lone crusader and finally loses funding
- Managers find the process group is actually powerless
- Practitioners talk the talk but do not walk the walk
- The process group has fewer and fewer interactions with the projects
- A few sporadic improvements are made, but there is no synergy
- Process group people become weary of the frustration of trying to make things happen alone
- Improvements are not sustained, but fade after the champions leave
- Neither management nor practitioners understand the concepts of process well enough to apply them to their own work

Symptoms of a deeper problem?

- Process Engineering work is difficult even at the best of times
- How many of these difficulties stem from ourselves and our approach to the problem, and how many of them are truly beyond our control?
- Perhaps we need to think more deeply about the nature of Process Engineering.
  - Process Engineering phenomena are almost completely unstudied by any other discipline
  - Those who practice Process Engineering lack training in many relevant disciplines
  - Many assumptions of the Process Engineering discipline remain unexplored and invalidated

Ripe for a Paradigm Shift?

- Perspective: *Our viewpoint on human beings and their relation to the world has a profound impact on what we do within Process Engineering*
- Question: *The disconnect between description and enactment is a major stumbling block -- why does that split exist?*
- Problem: *The sociopsychological and politicoeconomic nature of process improvement continually overshadows the technical approach*
- Solution? *Important relevant intellectual problems remain unsolved and even unrecognized*
  - How to describe non-routine work?
  - How to measure process quality?
  - How to define self-organizing processes?
  - How to understand the nature of work?

What is a Paradigm Shift?

- Thomas Kuhn introduced the term ”paradigm shift” to describe scientific revolutions
- Revolutions must be seen in contrast to what he calls “Normal Science”
- Normal Science uses a shared “paradigm” or set of underlying assumptions about the world to guide research into the nature of things
- As Normal Science proceeds, anomalies pile up as counter assumption examples which are ignored by the research program of normal science
- Occasionally someone will reformulate the assumptions of the discipline in a way that explains the anomalies and causes new problems to open up for research
- A paradigm shift is when almost everyone accepts the new assumptions

Process Improvement Has Assumptions . . .

- We can identify work as separate and opposed to other kinds of human behavior
- We can make work more efficient and less error prone by scientific management techniques
- It is possible for people to follow a work prescription like a recipe to complete any kind of task successfully
- Training is the primary means to help improve work performance
- We can effectively measure human work and make objective changes to it to optimize measurements
- Records of work transactions are sufficient evidence of performance of different kinds of work
- Generic descriptions of work can effectively describe specific concrete instances of work actually performed and help work to be performed in a more disciplined manner

Can We Claim That a Scientific Research Program Exists for Process Improvement?

- A research program needs competing theories that can be tested
- Any statement that cannot, in principle, be disproved is philosophy, not theory
- Only active attempts to disprove hypotheses extracted from theories count as scientific research
- A program of research means a planned set of experiments based on specific explicit theories leading to the goal of validating the theories
- Experiments uncover anomalies that challenge the assumptions upon which the research program is based

What we have is not a scientific research program!

We might go so far as to call a discipline that condones measurement without explicit operationalized theory a kind of pseudo-science!

Taylorism

- Frederick Winslow Taylor founded Scientific Management as a discipline in 1911 with the publication of his book of that name.
- He objectified the worker as an object to be measured
  - Time and motion studies of simple tasks
  - Considering the factory as a system
  - Making efficiency the principle goal
- He discounted social and psychological aspects of work
- Work was treated as mechanistic with isolatable and manipulatable parts that were the body movements of the worker
- Workers where considered to be appendages to the machines they operated
- This became a pseudo-scientific approach to work organization that gained widespread use in industry
- Based on a kind of scientific or rationalistic utopianism or naive empiricism

Reactions to Taylorism

- Human Resources Movement
- Industrial Sociology and Psychology
- Socio-technical Systems
- Organizational Dynamics

- Taylorism was recognized to be too extreme
- Hawthorne effect was discovered
- Reactions emphasize humanistic values and social dimensions of work
- Many of these reactions were incorporated into industrial practice
- Changes in industry also affect the development of scientific management

Evolution of Industry

- Craft -- skilled human at the center of work effort surrounded by tools of his trade
  - Prior to the industrial revolution in England
  - Each craftsman does multiple jobs as part of producing a whole product
  - High degree of variety in work and in the product

- Machine Tending -- machine at center surrounded by humans whose skill level has been reduced
  - The factory itself is seen as a system of production to be managed scientifically
  - Taylorism was seen as a major advocate of the degradation of skills in workforce
  - Less variety in work and product

Evolution of Industry

- Assembly Line -- tended machines connected by conveyor belt
  - Parts standardization
  - Continuity of production
  - Constrained or rigid machinery
  - Reduction of work to simple labor process
  - Low degree of variety in work and product

- Continuous Process -- the whole system is tended by workers
  - Feedback
  - Automatic and integrated control
  - Workers supervise and deal with unforeseen changes
  - Reskilling -- workers need more and higher level skills
  - Lines blurred between workers and managers

Evolution of Industry

- Discontinuous Process -- Heterogeneous Uncontrolled Meta-systems
  - Decentralized organization
  - Non-hierarchical control -- self-managed teams
  - Continuous flows difficult to find
  - Dependent on emergent properties of systems
  - Emphasis on adaptability and flexibility
  - Emphasis on research and discovery
  - Multi-discipline training
  - Generalists valued over specialists
  - Myriad ecologically connected systems within a meta-system
  - Virtual corporations for short durations

Out of Control -- the new paradigm

- distribute being
- control from the bottom up
- cultivate increasing returns
- grow by chunking
- maximize fringes
- honor your errors
- pursue no optima; have multiple goals
- seek persistent equlibria
- change changes itself

Kevin Kelly Out of Control

Engineering Work Today

- Designs continuous physical process system's technological infrastructure
  - Extremely complex systems
  - Sophisticated technological apparatus
  - Continually pushing the envelope of what is possible
  - Demands high degree of knowledge and expertise
- Deals with multiple interacting disciplines
  - Systems Engineering
  - Software Engineering
  - Hardware Engineering
  - Logistics
  - Production Engineering
  - Management
- Integrated Product Development -- Concurrent Engineering

Later Developments of Taylorism

- Industrial Engineering focuses on factory work
- Systems & Procedures Analysis focuses on office work
- Business Process Re-engineering focuses on enterprise
- Total Quality Management focuses on customer response to product
- Statistical Process Control focuses on flows in processes
- Process Improvement focuses on technical engineering work seen as a continuous system
- Neo-Taylorism normally grows up in industry without academic underpinning
- Tends to look at work narrowly in terms of some simplistic measures of efficiency
- New versions of Taylorism tend to be more realistic and less utopian

Neo-Taylorism

- Applies continuous process control theory back onto the work that produces the continuous system
- Treats workers as transformers within a cybernetically controlled continuous system
- Applies Statistical Process Control to fluxes of behavior within the developmental system
- Osterweil: software process itself can be described and controlled by software
  - Process Programming allows us to "program" the work within the development environment
- Is cybernetic and system oriented with an emphasis on technological solutions channeling human behavior

What is this we are involved in?

- Cultural change
  - New artifacts are being produced that record how work is done
- Social change
  - New relations are being established between management and practitioners with the entry of process group members
- Business change
  - A tax is being levied internally within each organization to support the process group and make changes in the way business is done
- Technical change
  - Processes are the context for changes in methods and tools

This is a change in the way change is viewed within organizations. Change is now anticipated and managed; not merely suffered or dictated.

Organizations are attempting to take a proactive approach to change management

A change in the way we change --- That is a meta-change

- A meta-level language is a special kind of language by which a lower level language is described
  - For example, they give us a way to talk about talking as when we construct a grammar
- It is possible to have a hierarchy of meta-levels for the description of any system
- Meta-levels are a way of controlling changes to descriptions
- We can control the way we change by moving our concerns to the meta-level where we describe changes such that the descriptions can be manipulated
- When we manage "change," we change the changes that occur systematically and in a controlled fashion

Meta-levels of Change

- Unchanging Things
  - Everything is static even though time flows
- Meta^1-Change
  - Change -- Heraclitean Flux -- never step into the same river twice
- Meta^2-Change -- management
  - Changing changes -- guidance or cybernetics
- Meta^3-Change -- adaptation
  - Changing the change of changes -- we find new ways of managing change
- Meta^4-Change -- flexibility
  - Changing the change of changing changes -- multiple adaptations simultaneously
- Meta^5-Change -- unthinkable

Levels of Learning

- Known things
  - Everything we accept as facts
- Meta^1-learning
  - Learning new things we did not know about before
- Meta^2-learning -- education
  - Learning to learn -- finding out new ways to learn how to learn things
- Meta^3-learning -- research
  - Learning to learn to learn -- changing the set ways that we know about that will allow us to learn things
- Meta^4-learning -- discovery
  - Learning to learn to learn to learn -- changing our whole view of the world
- Meta^5-learning -- unthinkable.

The Hierarchy of Levels of a Tradition

- FACTS
  - Statements which are congruent with an accepted theory
- THEORY
  - A set of concepts which give a coherent explanation of a phenomenon based on a paradigm
- PARADIGM
  - A set of assumptions which regulate how you look at things within the world that exemplify an episteme
- EPISTEME
  - A set of categories of knowledge by which you can understand things within a worldview
- WORLDVIEW
  - A set of possible things and their relations within the totality of what can exist

Facts Are Not What They Seem

- Facts are constructed, not objectively available
- Old theories are embedded in our perceptions of things now
- Changing theories implicitly changes the facts
- Rashimon effect -- different viewpoints see different sets of facts and different relations between facts
- Without an explicit theory, any fact is suspect
- Even with an explicit theory, statisticians are beyond the "Damn Liars" (Mark Twain)
- All facts are socially constructed through negotiation and mutual agreement of all parties involved
- Facts that are generally accepted are designated as real, but that designation could change at any time

Theory Guides Practice, but . . .

- The current theory of Process Improvement is implicit, not explicit
  - We have changed from a reified product-oriented view of things to a behavior-based view; but that behavior-based view is no more explicit than the old view; it is presented by a series of untested blanket statements
- The implicit Process Improvement theory is not connected with any explicit social science theories or research
- Current theory makes naive assumptions about the relation of
  - texts (theory) to action (practice)
  - technique to the social
  - power to acceptance
  - use value to exchange value
  - prescription to description

Paradigm Guides Theory

- Every theory, even the explicit ones, have hidden assumptions we do not even know we are making
  - What you SEE (theoria) is based on your explicit concepts and implicit assumptions
  - Anomalies only show up when you project an explicit theory by engaging in an active research program
- Anomalies are the basis of paradigm change
  - Paradigm change occurs when we make explicit a hidden assumption and then change that assumption
  - Paradigm plays the important role of limiting what you can see at any one time; it covers multiple viewpoints but within a single discipline

Epistemes Guide Paradigms

- Multiple classifications are possible, but all classifications share certain fundamental categories that are the core of the episteme
- How you classify things regulates how your can conceptualize them and the kinds of assumptions you can make about them
  - Epistemes are shared across disciplines, whereas paradigms only function within a discipline
  - Epistemes change too -- and when they do, what is knowable and how it is distinguished and categorized changes in all disciplines simultaneously

Worldviews Guide Epistemes

- Different sociocultural groups have different worldviews
- The worldview is all encompassing and inescapable
- It is the specific coherence of the facts, theories, paradigms and epistemes that are socially constructed and culturally propagated
- The worldview is the active projection of the collective unconscious
- Individuals are completely immersed in the worldview of their society from birth, and it is like water to fish -- or air to us -- we don't see it unless its rules are violated
- The rules of a worldview are expressed as taboos or imperatives
- Generally worldviews function to minimize categorical dirt and maintain purity of epistemic categories
- The lifeworld is your consciousness of your world as you live in it

We Suddenly See the Human Behavior Behind the Product

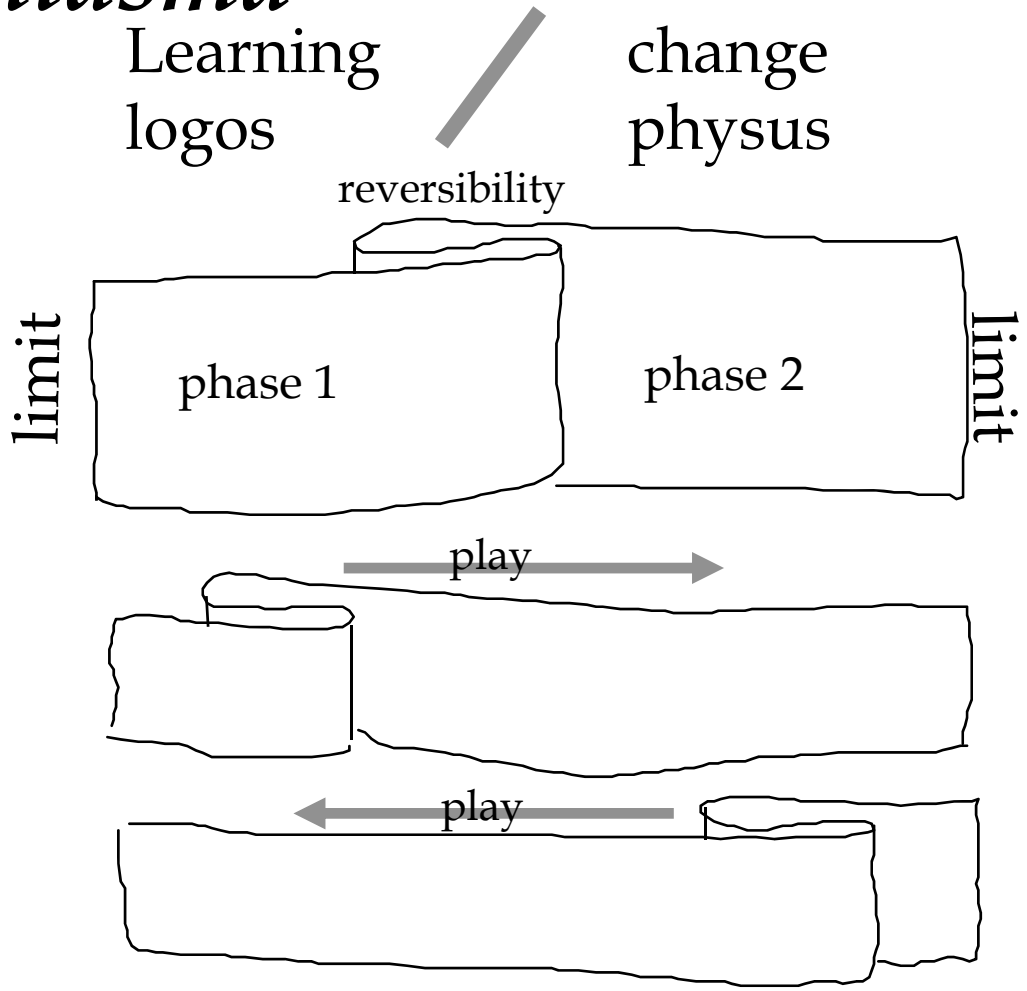
- Products are not just physical things with no history that suddenly appear full blown from organizations
- Products (the physus) has a comet's trail of (logos) that appears as the human ordering work that organizes the product
  - This relation had always been there, but prior to the recent cultural changes it was taboo to dwell on this connection
- The prior imperative was to separate the maker from the made thing as much as possible
  - Now we are turning to see the made thing as a mirror reflection of the maker
- This appears because we are turning more and more to look at quality rather than quantity as our prime measure of the product

Change and Learning in a Tradition

- All the different meta-levels of change and learning could conceivably operate on each of the levels within a tradition
  - Each of these levels have specific kinds of knowledge associated with them, and the meta-levels of learning would apply to those kinds of knowledge at each level
- The differences between change and learning reflects the fundamental split between physus and logos in our worldview

Physus	Logos
meta-levels of change	meta-levels of learning
control oriented	understanding oriented
objective group consciousness	subjective consciousness
practice	theory
physical	***intellectual***

Chiasma



- Any duality may be seen as a chiasma; a single interval with two limits

A change in our worldview

- The split between logos and physus in our tradition is being challenged
  - New physics is showing that minds affect physical outcomes of experiments by choosing what experiment to run
  - This fundamental interdependence between consciousness and matter is causing massive shifts in our understanding of our world
  - What started off as a paradigm in physics is turning into a massive intellectual transformation in our worldview which is causing our fundamental categories by which we identify things to change
- Work Process Engineering is part of this great shift in our culture's view of things
  - In this case expressed as a change in our values with regard to work in relation to products
  - We are recognizing the importance of the human contribution to the product in the process of creating the product that is expressed in the quality of that product

Quality and Quantity

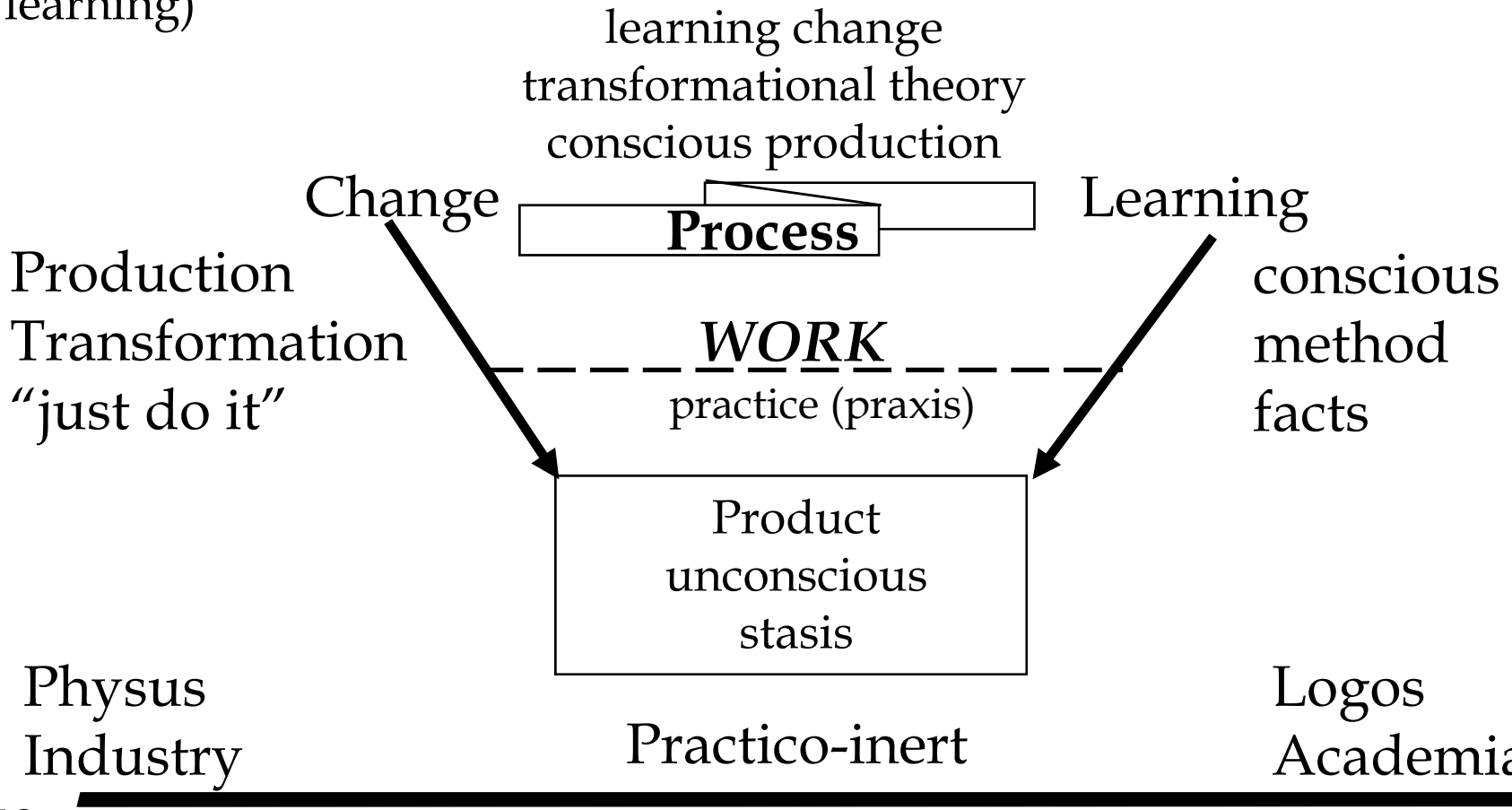
- Mass-production turns to quality oriented flexible production
  - We have perfected quantity (mass) production
  - But the Japanese foresaw that higher quality products will sell better than low quality products (even if the price is higher)
  - Our ability to make a lot of something is not good enough; we must be able to make a controlled number of things with changeable features and high quality
- Dialectics
  - The dialectic says that as quantity increases, the quality of the overall set of things changes
  - The inverse dialectic says that as quality increases, then the number of things produced of any one type decreases and the number of features that must be changed increases.
  - As the markets get more sophisticated, we become locked into the inverse dialectic

Process Engineering Arises

- New emphasis
  - We view the product linked with the process by which it was created (its human history)
  - We concentrate on increasing quality and production flexibility through engineering optimization
- Process Engineering is the natural result of the inverse dialectic
  - It posits that quality is placed in the product by manipulating the human history of the product
  - It posits that quality can be optimized by improving how work is done as the product comes into existence
  - It posits the goal of continuous process improvement as we move asymptotically toward higher and higher quality and efficiency
  - It unifies logos and physus and quality and quantity in a single feedback structure, destroying the old taboos and creating a new imperative.

First Meta-Level of Change / Learning

- Work applies change and learning simultaneously to create the product
- Work results in personal growth and external production
- Process is the sameness of change and learning (learning-change, changing learning)

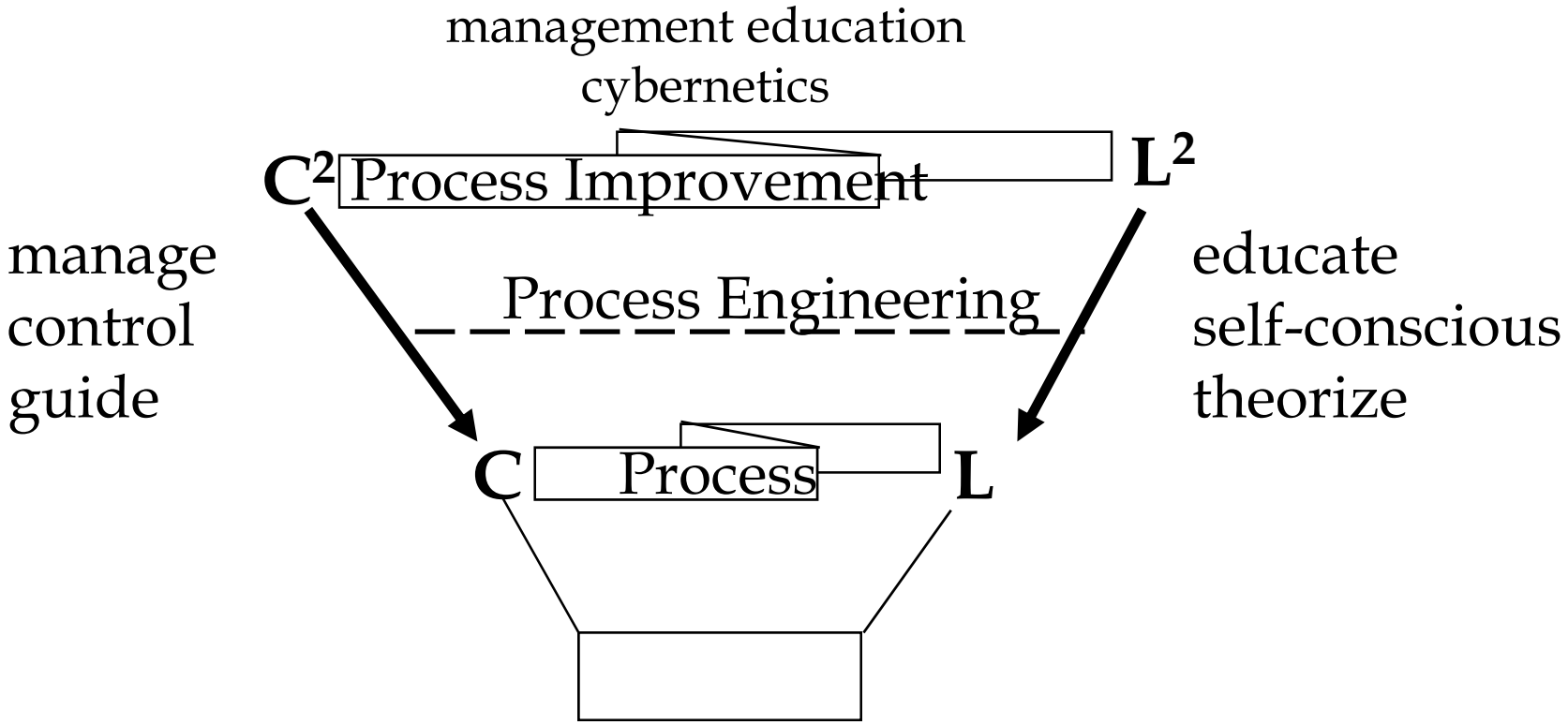


Work versus Process

- WORK
  - Maintains duality
  - Learning separated from doing
  - Theory separated from practice
  - Managers separated from workers
  - Action, plan, action, plan
- PROCESS
  - Duality vanishes
  - Learning while doing
  - Theory guides practice, practice guides theory
  - Self-managed
  - Conscious production

Second meta-level of change/learning

- Process Engineering manages change, and educates learning
- Improvement comes from combining guidance with self-consciousness



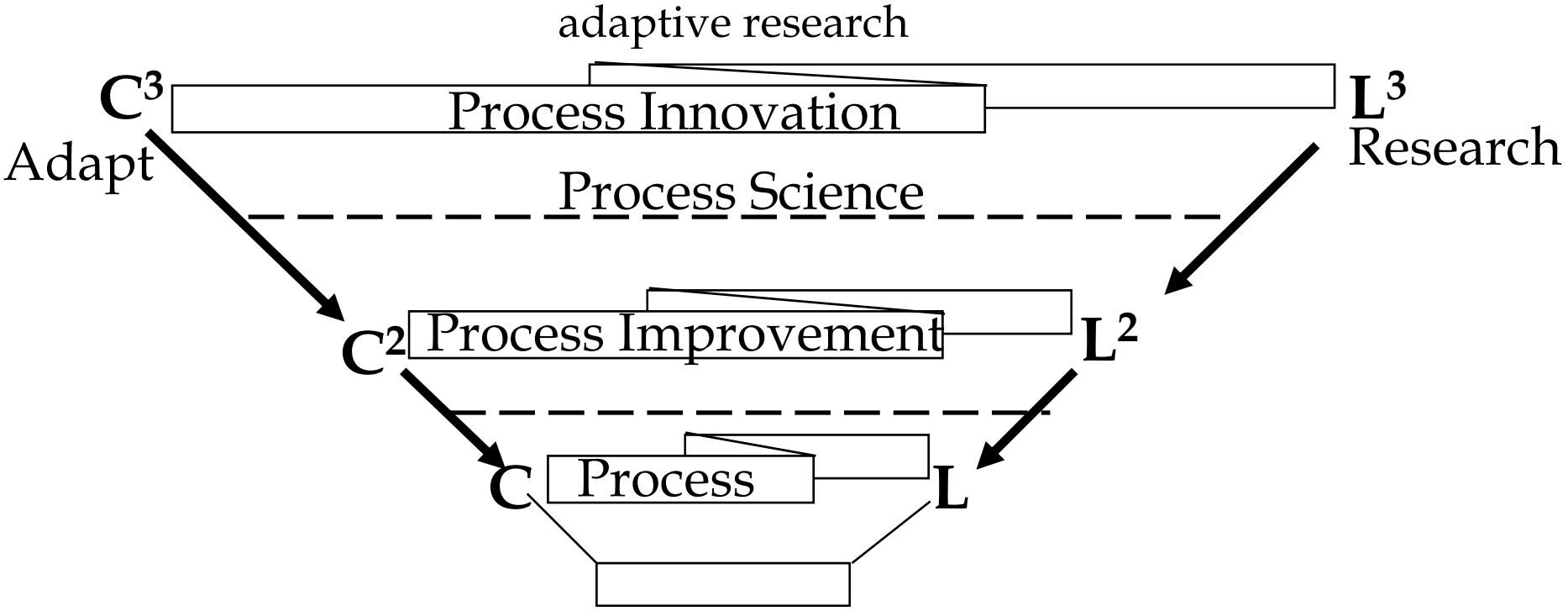
Engineering versus Improvement

- Maintains duality
- Management controls training of workers
- Management controls production and consumption of resources
- Management maintains secrecy
- Theory (design) done by one group and implemented by another
- Reflection separated from doing things
- Organization from the outside

- Duality vanishes
- Learning organization
- Production and consumption managed by team
- Open books
- Concurrent Engineering
- Reflection in the midst of work -- self-conscious
- Self-organizing

Third Meta-Level of Change/Learning

- Process Science applies research and adaptiveness to Process Improvement
- Innovation is the belonging together of adaptiveness and research



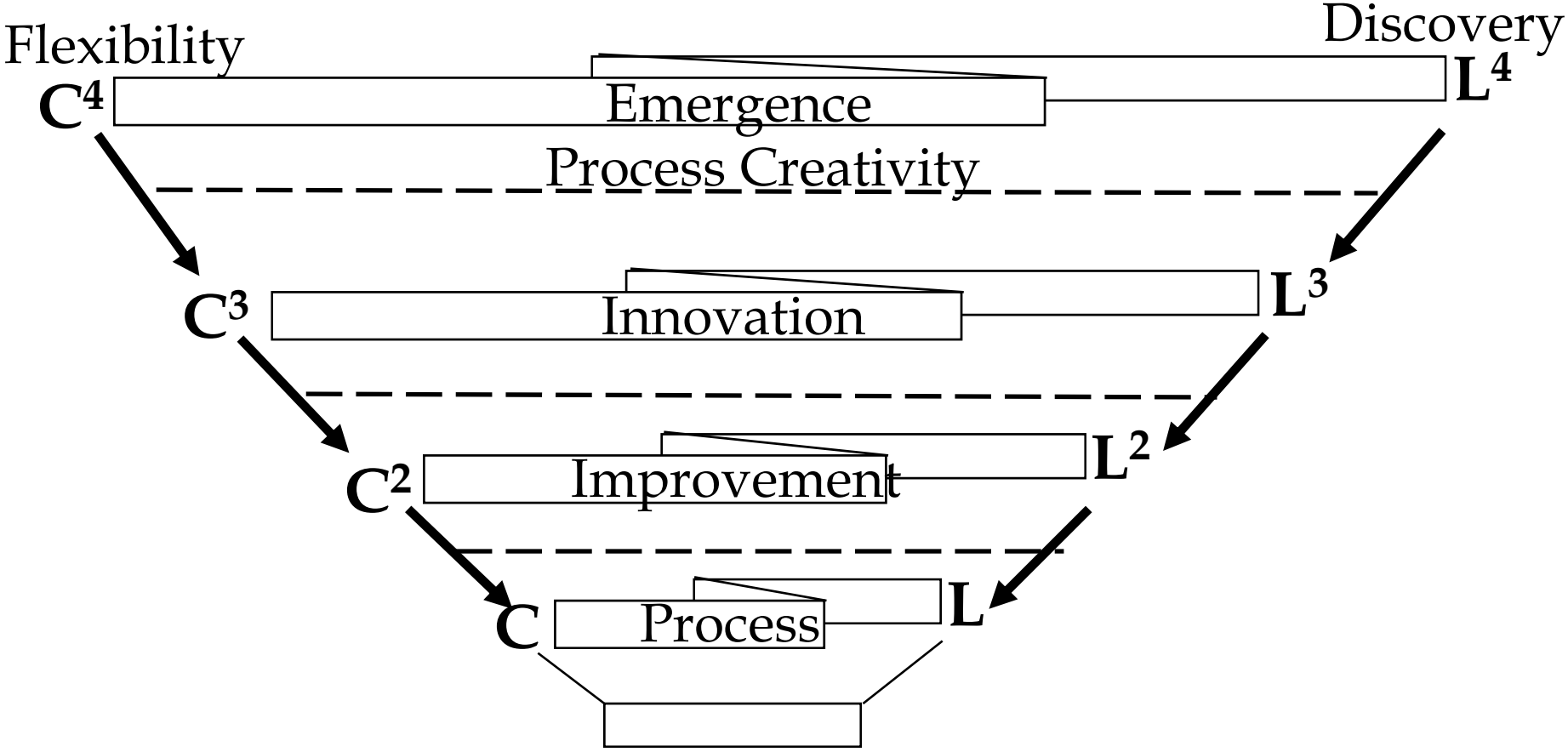
Science versus Innovation

- Maintains duality
- Academic study of Process separate from work itself
- SEPG controls process of others but not its own
- Improvement comes from outside source
- SEPG approves adaptive changes in processes
- Consultants know more about the work -- internal knowledge lost

- Duality vanishes
- Action research
- SEPG studies own processes as well as those of others
- Self-improvement by practitioners
- Practitioners adapt their own processes
- Practitioners know the most about their work -- record their knowledge

Fourth Meta-Level of Change/Learning

- Process Creativity applies flexibility and discovery to innovation
- Emergence is when new kinds of work come into existence

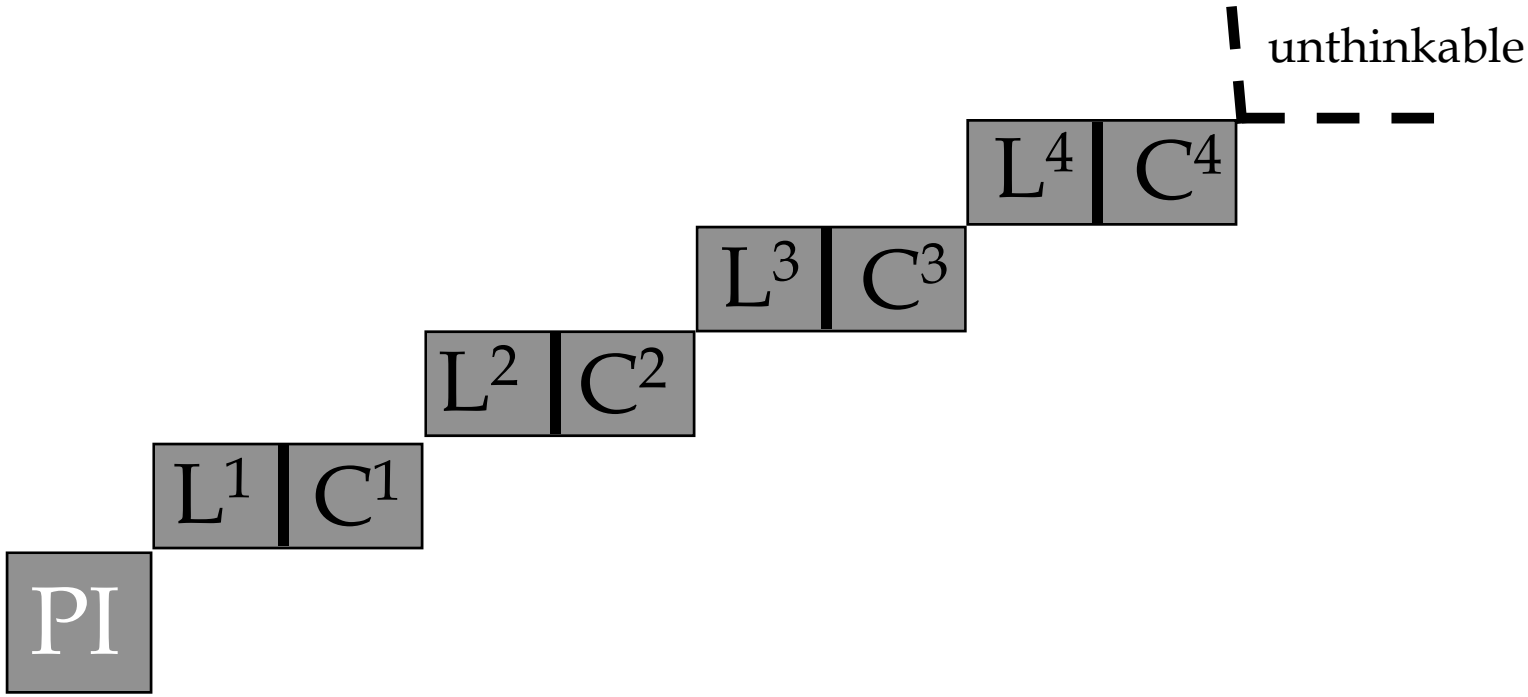


Creativity versus Emergence

- Maintains duality
- Creativity considered psychological
- Flexibility of organization separated from its ability to make discoveries
- Organization does not control its adaptation
- Brittle organization
- Discoveries by luck
- Oriented toward world

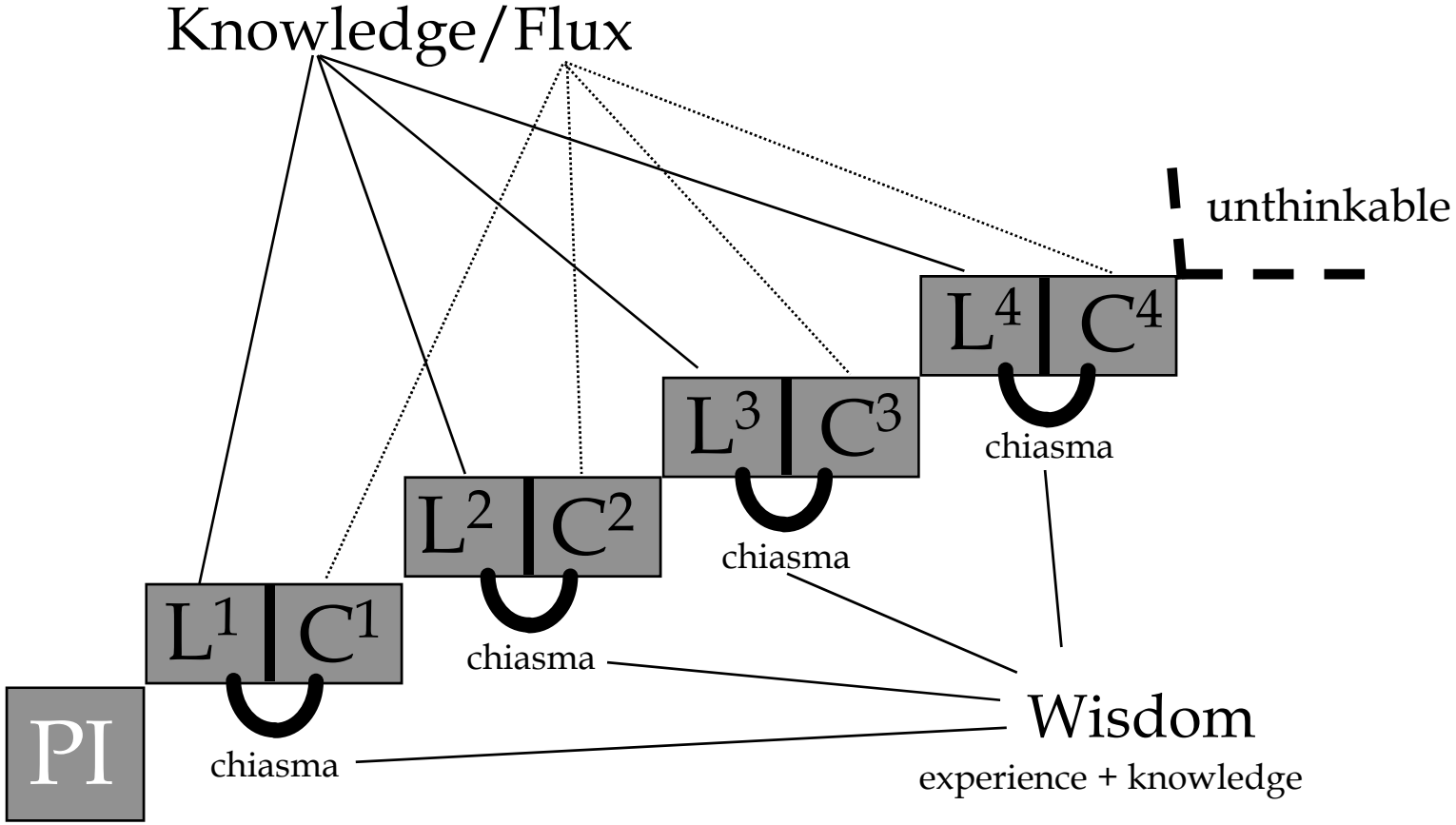
- Duality vanishes
- Creativity seen as social
- Organization explores with its flexibility, and through that exploration process makes discoveries
- Adaptation is self-conscious
- Resilient organization
- Discoveries actively pursued
- Oriented toward the new arising from the void

Stairs to Nowhere



- Meta-levels give a model of possible levels of process

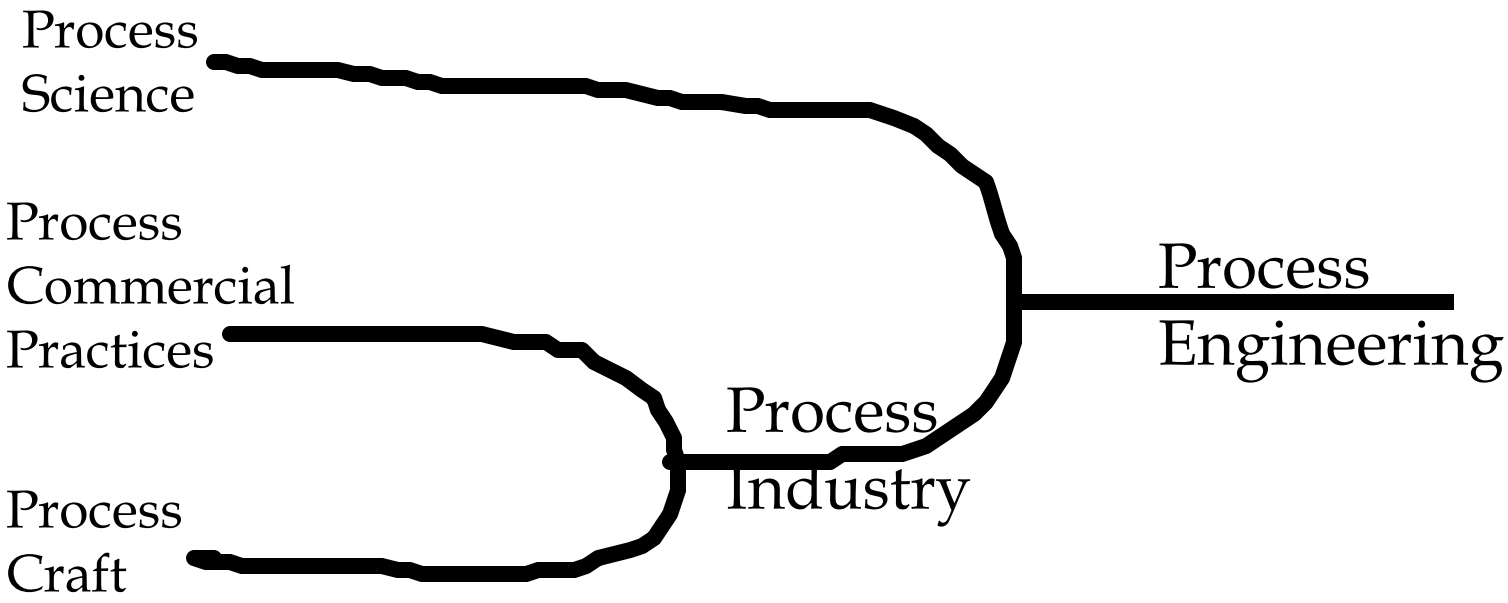
Knowledge in Flux Leads to Wisdom



- When the unthinkable and the practico-inert merge you have an Escher waterfall

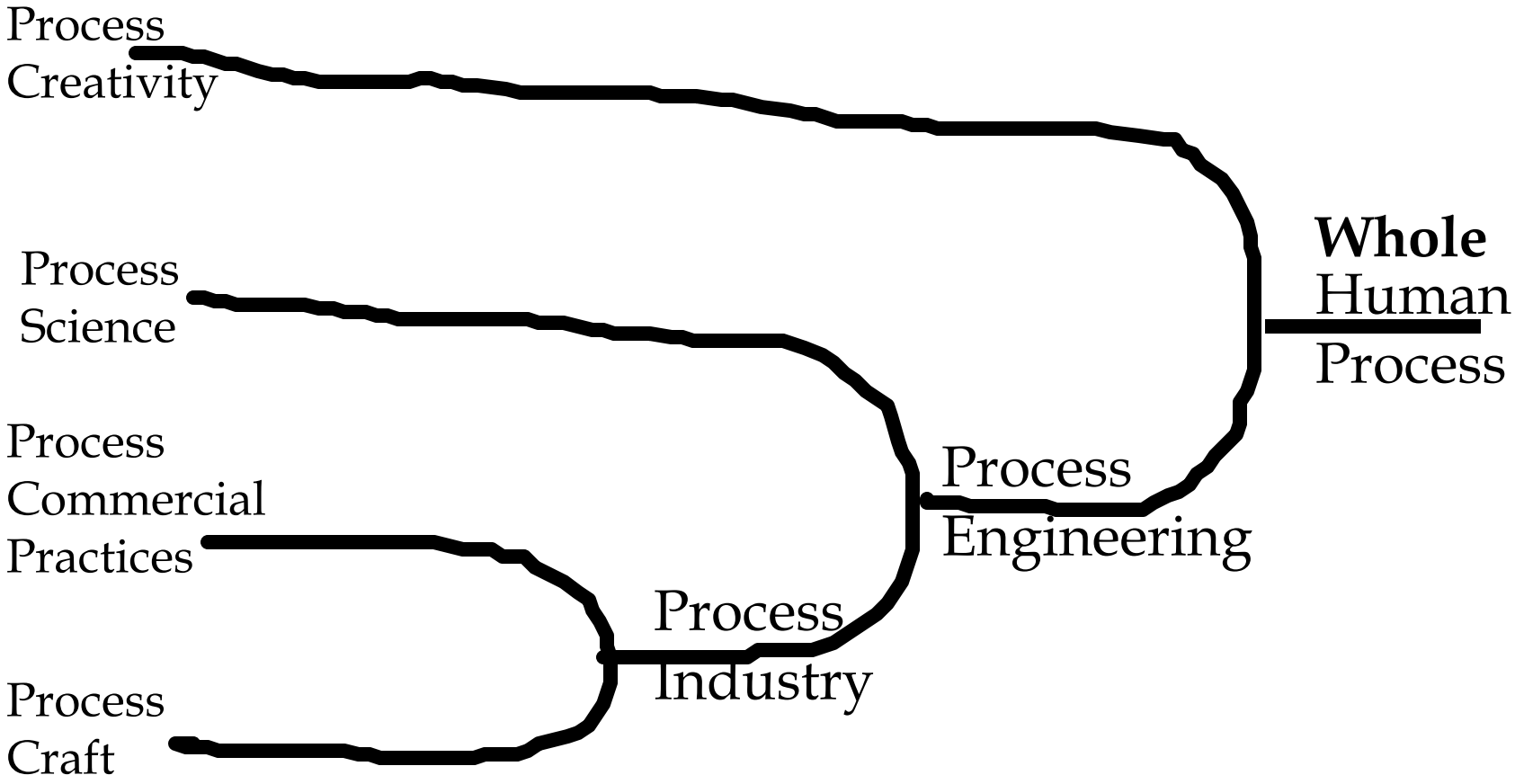
Engineering Dependent on Science

- The path to process engineering is similar to the proposed path to Software "Engineering"
- Industrial practices must connect to Process Science to become a real engineering discipline



Science dependent on creativity

- Success is dependent on treating the whole human being, not alienated fragments



Work Process Craft

- SEPGs in isolation are left to invent the means of gaining maturity themselves
- No studies of different approaches exist; all approaches are assumed to be equal
- Few metrics show that process improvement saves money or actually improves things
- A few highly publicized cases of success and not much concrete guidance
- Motivation for improvement mostly external

Work Process Commercial Practices

- Establishes industry-wide best practices in a given discipline
- Establishes standards and maturity models
- Does benchmarking between companies to establish the state of the practice
- Produces Assessment and Evaluation instruments
- Produces common guidelines for processes, methods and techniques
- Shares generic information about processes

Work Process Industry

- Process consulting
- Training organizations
- Process tool vendors
- Process workflow environments
- Computer aided cooperative work tools
- Professional organization of work process engineers
- Academic and professional journals on Process

Work Process Science

- Integrates a technical understanding with knowledge of the social sciences
- Formulates explicit epistemes, paradigms and theories as a basis for determining facts
- Studies anomalies in order to allow paradigm shifts to clarify the picture of the phenomena
- Has a positive research program based on a paradigm -- normal science
- May undergo revolutionary change in understanding based on the falsification of theories and changing assumptions

Work Process (Re-)Engineering

- Multi-disciplinary look at processes within organizations to balance product-oriented views
- Advocating either evolutionary or revolutionary change
- Uses research and discoveries from academic sources concerning process to develop the commercial practices into something that can be relied upon to produce stable results
- Needs to be based on something like the model of meta-levels of change and learning in order to cover the whole field
- Is a distant goal that we can at the moment envision and dream of, but only approach by small steps.

Work Process Creativity

- Focuses on the whole human within the work situation
- Recognizes the necessity of non-routine work
- Deals with the artistic side of process creation
- Looks for ***wisdom*** beyond mere maturity
- On the lookout for emergent events that will cause radical alterations in the process
- Combines flexibility with discovery in creative ways
- Concentrates on human creativity and how that impacts the work process

Studies in Human Process

- Needs interdisciplinary approach in order to study how creativity interacts with process
- Human Process Studies is like Human Ecology
- Focuses on epistemes which cross the boundaries of disciplines rather than paradigms
- Epistemes are categorizations of knowledge
  - What constitutes work?
  - What are the roles of learning and change in relation to work?
  - How do new things that we must respond to enter existence?

Process Studies are ultimately confronted with the problem of human creativity and emergence of the new

Creativity and Emergence

- Dissertation The Structure of Theoretical Systems in relation to Emergence
- Sociology of creativity?
- Studied philosophy of science instead and the problem of emergence -- how new things come into existence
- Creativity is the obverse of emergence
- Final conclusions of research is that new things come into existence in a series of four stages
  - Something is out there but do not know what it is
  - Appearance of anomalies in spite of repression
  - Association of anomalies at margins
  - Revolutionary new understanding via paradigm change

Emergence and Worldview

- The stages of the process of emergence is indicative of structuring of our worldview
- There are different modalities by which we relate to the world, and any genuinely emergent thing must pass through all these modalities to be seen as genuinely new
- There are generally held to be four layers to our handling of things within the world

Pointing	present-at-hand	Frozen Pure Presence	Meta-level 1
Grasping	ready-to-hand	Process Being	Meta-level 2
Bearing	in-hand	Hyper Being	Meta-level 3
Encompassing	out-of-hand	Wild Being	Meta-level 4

- Modern phenomenological ontology studies these modalities of the human relation to his/her world

A Complete View of Work Process

- Studies of work process must . . .
  - Cover all of these modalities of human relation to the worl
  - Be formulated in terms of facts, theories, paradigms, epistemes and worldviews.
  - Go beyond engineering and science to approach the core of the human being who is creative and who witnesses the emergence of new things in the world.
  - Be open to changes in theories, paradigms, epistemes and wordviews
- Only by starting with a global view of what it is to be human within the context of the work situation is it possible to formulate a satisfactory theory of work processes and how they work