

# *Complexity Sciences*

## **Future Research**

### The 10-Year Trend for Healthcare Organizations in the United States



The reach of one's globalization is defined  
by the limit of the pronoun "WE"...



**The Unicist Research Institute**  
Pioneers in Complexity Science Research since 1976



## The 10-Year Trend for Healthcare Organizations in the United States: 2017 - 2027

This is a synthesis of the trends developed at the Future Research Lab on the “Evolution of Healthcare in the US” led by Peter Belohlavek. They are based on the global healthcare trends in developed countries that have been developed.

The objective of this research was to find the trends that underlie the healthcare business in the US and to develop the future scenario that arose based on the changes introduced in medical regulations and on the possibilities opened by the use of new technologies.

The 10-year trends can be synthesized in:

- The trend towards expansive healthcare organizations
- The trend towards patient centered management
- The trend towards adaptive information technology solutions
- The trend towards using semantic objects to segment

### Introduction

Two structural changes happened in the United States:

1. The transparency of the use of electronic medical records established a new starting point for medical practice.
2. The concept of the Accountable Care Organizations and its analogical multiplication in medical practice introduced the concept of profiting from healthcare improvements.

This triggered the need of adaptiveness for healthcare organizations.

New technologies that made structural adaptiveness possible:

1. Adaptive Information Technology
2. Semantic objects to manage adaptiveness
3. The discovery of the human drivers of attitudes
4. Double dialectical logic to manage adaptiveness

The integration of the structural changes and the now available technologies is predictable based on the understanding of the power of the archetype of the US.

If you are interested in learning about the unicist future research technologies that are used to develop future scenarios we recommend you to access:

<http://www.unicist.org/sdp.shtml>

## These Trends are a Back to Hippocrates in the XXI Century

*Back to Hippocrates means going back to the natural role of medicine.*

*In the XXI century it implies the use of an object driven organization model integrating processes with objects in order to ensure results and optimize the use of energy.*

*The Value Adding Approach is basically driven by the development of a model based on the use of the rules of Patient Centered Management.*

*The operational objective is to maximize the value added to patients considered as clients.*

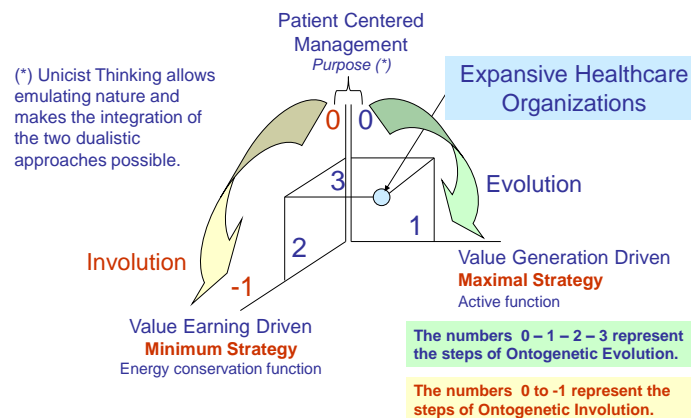
*It is a backward-chaining-thinking approach beginning with the value being added and ending with the process and objects that are needed.*

*The process is centered on patient orientation, added value assurance and result assurance*

### 1) The Next Step in Healthcare: Expansive Healthcare Organization (EHO)

Expansive healthcare organizations are an upgrade of the two major trends in medical practice: vocation driven and profession driven.

Unicist Ontogenetic Map of Expansive Healthcare Organizations  
The Unicist Ontology in Unicist Standard Language



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EHO are organizations that expand the size of their community in order to increase the level of wellbeing of their members.

Their activity is naturally patient centered in terms of their focus on health.

The patient centered management requires the integration of results assurance, patient orientation and added value assurance in order to sustain the focus on health.

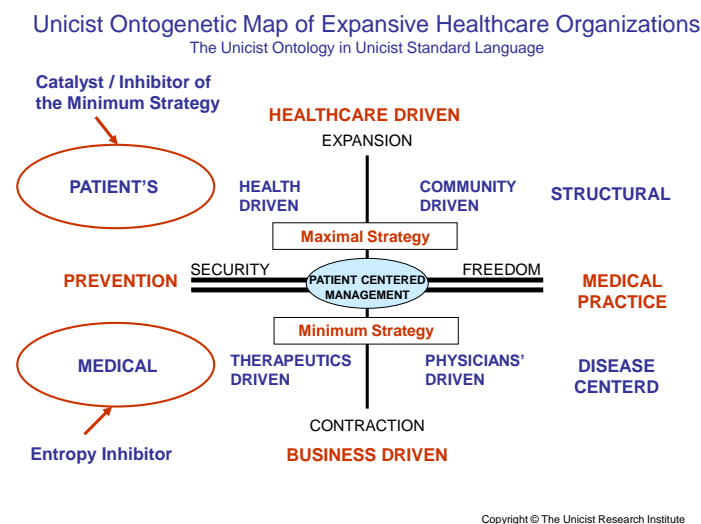
The maximal strategy is focused on the generation of value measured in terms of health.

Having a structural medical practice allows dealing with health, going beyond the necessary specialties that are needed to cure patients.

Patients' prevention is the catalyst of the expansive healthcare organization, which allows expanding the boundaries of the community of patients.

This implies influencing actively their community in order to foster prevention.

The minimum strategy is focused on the healthcare business which is materialized in having the necessary disease centered medical practice and the medical prevention.



The goal of the minimum strategy is to ensure the business of the EHO.

Medical prevention is the entropy inhibitor to sustain the community and avoid its entropy.

The segmentation of expansive healthcare organizations defines the way they manage the patient centered attitude.

- 1) Physicians driven
- 2) Therapeutics driven
- 3) Health driven
- 4) Community driven

## Physicians driven Organizations

This segment is focused on ensuring the patient orientation through a structural physician organization. Their core is the organization of the role of physicians.

## Therapeutics driven Organizations

This segment is focused on providing excellence in therapeutics in order to ensure patient orientation. Their core is the organization of the role of specialists.

## Health driven Organizations

This segment is focused on providing healthcare solutions for patients based on a holistic approach to health. The core is the role of health oriented physicians.

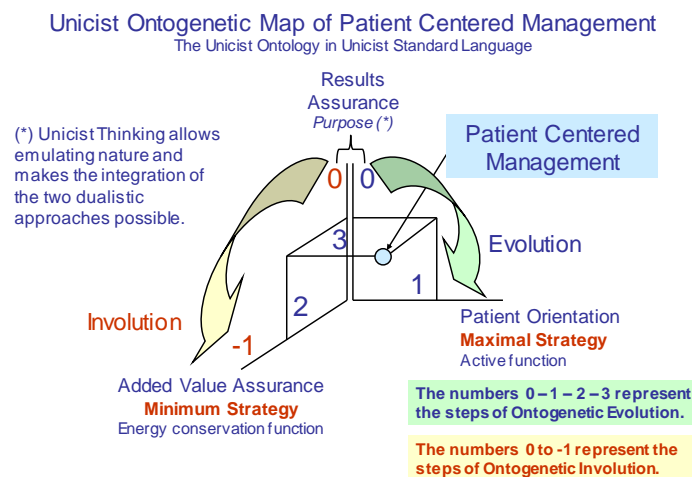
## Community driven Organizations

This segment is focused on being able to deal with the different segments that integrate the community to provide health. The core is the adaptiveness of the organization to adapt to the segments.

## 2) The Next Step in Healthcare: Patient Centered Management (PCM)

Patient Centered Management is an organizational meta-model that allows empowering the work processes in healthcare institutions.

It is homologous to Client Centered Management that is the natural model to guide work processes in businesses that was developed in the eighties.



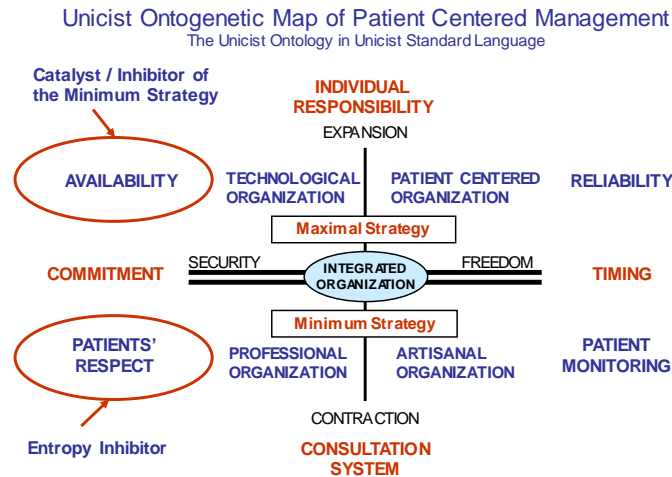
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On the one hand, PCM works as a conceptual action guide to design work processes and, on the other hand, it is the main catalyst for continuous improvement, change management and innovation management.

The purpose of the model is to assure results, its action is driven by patient orientation and there is a quality assurance that sustains the value added.

## PCM as a Meta-model

Meta-models need to be materialized in a system. As such we are not talking only about the hardware and software but also about the peopleware.



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Meta-models become meaningful when they are materialized in operational rules that have to be followed in a meaningful way.

The PCM generates four different segments of medical organizations:

- 1) Artisanal Organizations
- 2) Professional Organizations
- 3) Technological Organizations
- 4) Patient Centered Organizations

### Artisanal Organizations

Artisanal organizations are driven by the individual capacity of their members. The added value is assured by the use of metrics and administrative EHR.

The core of their functionality lays on the capacity to integrate adequately chosen members. The activity is focused on curing processes based on the knowledge and reliability of each participant.

They are based on the individual capacity of doctors and their capacity to cure the problem of the patient.

### Professional Organizations

Professional organizations are based on the fulfillment of roles that are based on the knowledge and authority of their participants.



Their strategy is defensive, based on ensuring the delivery of the necessary palliatives to cover the patients' needs while the curing process is being implemented. They need to use adaptive EHR to monitor the curing processes.

They are based on the knowledge of the doctors and their capacity to use it. These organizations are knowledge centered and naturally tend towards evidence based medicine.

## Technological Organizations

Technological organizations are based on the use of hard technologies to deliver the medical services. They tend to use the technological innovations to catalyze the professional role of their members.

They are usually dominant in the community based on the objective technology they use. They naturally integrate curing and palliating processes as a unit. They need to use adaptive systems to monitor their solutions.

They are based on having the most effective technologies to deal with the problems patients have.

## Patient Centered Organization

Patient centered organizations are driven by their need to provide solutions for the community. They are innovation, efficacy and reliability driven.

Patient centered organizations base their strategy on their innovation capacity and on the influence they can exert on the environment.

They are health driven which allows them to build large patient communities with healthier members. Patient centered organizations need to use administrative EMR to sustain the efficacy of their doctors.

## Integrated Organizations

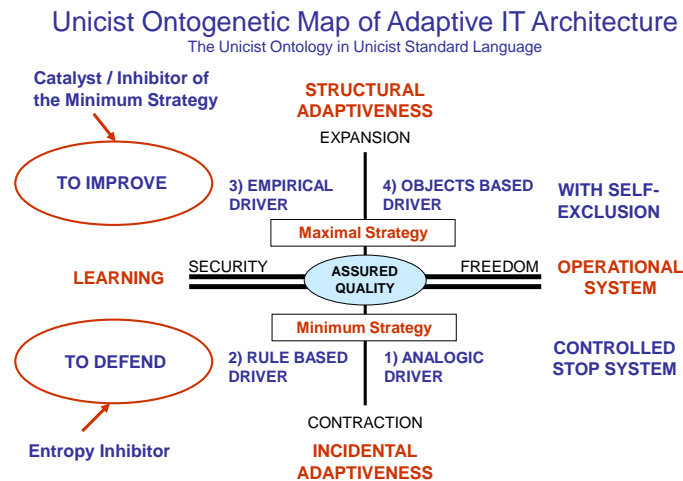
Integrated organizations include aspects of the different organizations to generate a natural environment for medical practices considering their specialties.

They are based on the professional roles of its members and an object driven organization model using medical objects, business objects and personal role objects to manage the adaptive processes of medical practice.

## 3) The Next Step in Healthcare: Adaptive IT Solutions

Adaptive IT solutions are systems that have been designed to interact with the external and internal environment. Nowadays, there are multiple programming solutions availa-

ble to sustain the unicist adaptive architecture. The solutions include aspect objects architecture with unicist logical inferences to manage adaptiveness.



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The evolution of Information Technologies allowed integrating the adaptive aspects of business management in the operational systems of hospitals.

The integration of the unicist logical approach and the resulting business objects included in the business processes within an adaptive IT environment allows driving business processes to the next level.

To be able to organize by objects it is necessary to use both adaptive and administrative systems to organize the work processes.

This widened the possibilities of hospitals to expand the boundaries of their activities within an environment of assured quality.

The level of adaptiveness varies according to the needs of the system. Adaptiveness is based on the medical, therapeutics and disease segmentation.

There are four levels of adaptiveness that can be managed:

### 1) Analogical drivers

This level is based on the recognition of the significant behavioral patterns of the segments of patients.

### 2) Rules based drivers

This level is based on the use of analogical patterns and the logical rules defined by the fundamentals that influence the processes.

### 3) Empirical drivers

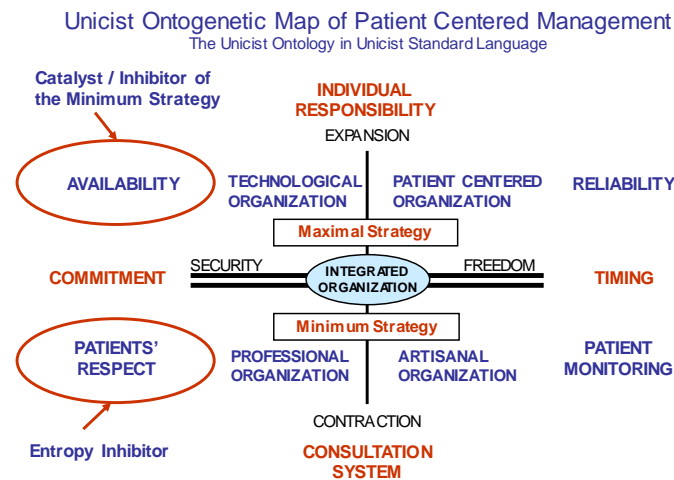
This level is based on the previous level and the integration of mathematical models to infer behavior based on the observable aspects of the fundamentals of the processes.

### 4) Objects based drivers

This level is based on the previous level plus the use of medical objects that work as interdependent drivers to influence the attitude of patients. The feedback is defined by the results produced by these objects.

## The IT Structure of the PCM

The integrator of the Patient Centered Management Model is given by the EMR / HER / EPR system.



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We have defined four segments of systems that produce differentiated behaviors in medical organizations:

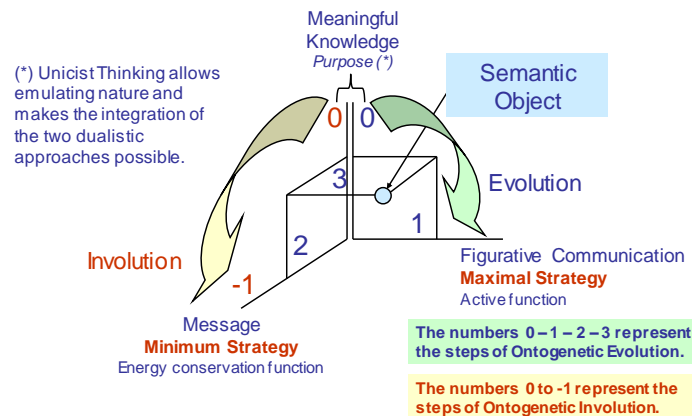
1. Administrative EHR driven processes to allow monitoring the disease of the patient
2. Adaptive EHR driven processes to allow monitoring the solutions provided by the doctors
3. Adaptive EMR driven processes integrated with adaptive and administrative EHR to ensure the synchronicity of the solutions provided
4. Administrative EMR driven processes integrated with EHR and EPR to focus on the health of the patient

### 4) The Next Step in Healthcare: Semantic Objects to Segment

Semantic objects are linguistics communications, in written or verbal format, that have the power to install meaningful knowledge in the long term memory of an individual.

## Unicist Ontogenetic Map of Semantic Objects

The Unicist Ontology in Unicist Standard Language



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Semantic objects are “adaptive systems” based on messages that use figurative communication to build meaningful knowledge.

These objects have a concept, an added value and a quality assurance in order to achieve their objective.

In order to build semantic objects it is necessary to manage the unicist ontogenetic map of messages and figurative communication.

They require no knowledge in order to be used. Users only need to know what they produce and how to manage their output.

Semantic objects are extremely segmented because they are driven by the use of language that segments based on its implicit reasoning pattern and its ethical mask (see ontology of languages).

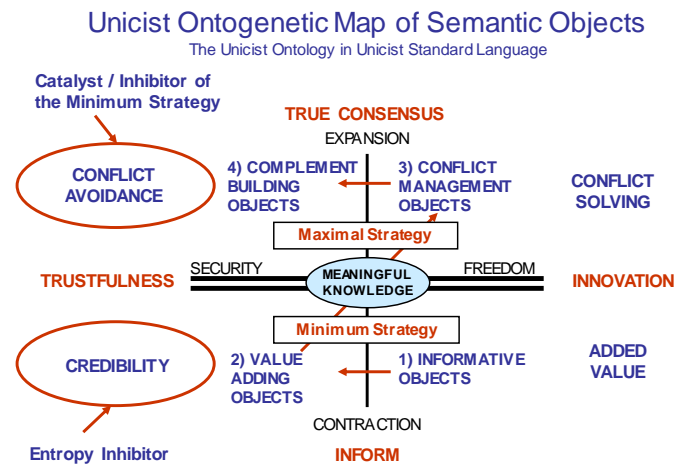
Semantic objects are the natural complementation for any communication that deals with human activity where results need to be achieved.

## Types of Semantic Objects

There are different types of semantic objects to influence different aspects of the long term memory of an individual.

1. Informative Objects
2. Value Adding Objects
3. Conflict Management Objects
4. Complement Building Objects

## The Structure of the Types of Semantic Objects:



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### 1) Informative Objects

These objects are used to approach the semantic memory of individuals.

They need to include a message based on news that people are expecting and their figurative language needs to be sustained by graspable analogies.

### 2) Value Adding Objects

These objects are used to approach the procedural memory of individuals.

They need to include a message based on a meaningful interpretation of the reality an individual is facing and their figurative language needs to be sustained by meaningful metaphors.

### 3) Conflict Management Objects

These objects are used to approach the episodic memory of individuals.

They need to be based on a mind opening figurative communication and include a message that has to be based on objective information.

### 4) Complementation Building Objects

These objects are used to approach the long term memory of individuals in its oneness. It is a structural approach that needs to include the different aspects individual consider when making a decision.

They need to be based on a homology driven figurative communication and include a message that opens and expands the possibilities of the individual.



## Conclusion

The next step in healthcare organizations implies the integration of vocation driven attitudes, which are focused on health, with professionalism driven attitudes, which are focused on business.

It implies that the scorecard of measurement of medical practice will include the measurement of health and not only the activities that happen within the medical organizations.

This will imply a structural change in the judiciary system dealing with malpractice problems. This change has already begun.

Adaptiveness is the name of the next step and the use of adaptive IT solutions, predicting interfaces and segmented communication are the way to sustain this new step.



## Annex

# About Complexity



## The Unicist Logical Approach to Complexity (a unicist ontological approach)

### **The unicist logical approach to complex problems**

The most primitive complex problem is given by two elements that have a biunivocal relation (loop). For example:

- The lack of credibility of an innovation inhibits its use and the absence of use impedes credibility.
- The absence of production causes inappropriate distribution and dysfunctional distribution causes a lack in productivity.

Until the appearance of the solution given by the unicist approach, there were four palliatives:

- Intuition
- More or less subjective arbitrary models
- Fallacies to avoid the perception of complexity
- Ceteris paribus

Complexity is self-evident in the field of social, institutional and individual evolution. It can be said that evolution is a complex problem itself.

Complexity is implicit in the core of the business world. Those who can apprehend it and influence the environment are successful. Those who cannot influence complexity, fail. The unicist approach is necessary for those who need to manage complex problems to transform them into simple solutions, easy to be implemented.

The Unicist approach transforms complex problems into simple solutions, and these simple solutions into “easy” actions.

We define a complex system as an open system, which determines the functionality of a unified field through the conjunction of objects and/or subsystems.

A complex system has the following characteristics:

- 1) It is an open system, meaning that the energy flows to and from the system itself.
- 2) The external limits of the unified field (its globality) behave as the ones of a fuzzy set.
- 3) Functionality is determined by the “conjunction” of elements that influence each other, generating “loops” of cause-effect relations.
- 4) The “disjunction” does not exist in a complex system.
- 5) The sum of the results of the subsystems is not equal to the result of the total complex system.
- 6) Relationships among subsystems are not linear; they respond to the double dialectics laws (purpose-antithesis / purpose-homeostasis).

- 7) Complex systems generate their own energy transformation using their own energy and the energy from the environment.
- 8) Complex systems are composed of subsystems, which are also composed of other subsystems, until reaching a descriptive level that is functional to their purposes.
- 9) Complex systems cannot be observed. The observer is part of the system.
- 10) Complex adaptive systems can only be measured in their results.

“The Unicist Theory of Evolution”, the “Unicist Logic” and the “Logic of Fallacies and the Anti-concepts”, made the conceptual modeling and operation of complex adaptive systems possible.

Some examples of complex adaptive systems can be found in the social, economical, political and cultural aspects of reality as well as in management, marketing, strategy (of countries, institutions and individuals), learning processes, continuous improvement and interpersonal relations.

Transforming complex systems into simple systems is making them operational in a univocal way, with cause-effect relations that permit to influence the environment. This means transforming strategy, which, by definition, is a complex system, into operational tactics.

Transforming them into an easy task implies materializing these tactics through well defined actions, using a language that could be understood by all participants and the proper tools that could be used by all of them.

Nevertheless, even though we operate with simple solutions, in their essence, these problems remain complex.

## The Unicist Logical Approach to Applied Complexity Sciences

The complexity of a specific aspect of reality is objective. This means that it is impossible to deal with it using cause-effect research without changing its functional nature. This indicates the existence of complexity.

The unicist approach to complexity sciences implies the discovery of the ontological structure of a reality and the objects that integrate it, defining the ontological algorithm and then the actions that can be done to influence such reality.

This approach starts with the finding of the nature of a specific element of reality and ends with the definition of the actions that can influence such reality.

The unicist ontology is a specific type of ontology that is structured emulating the ontogenetic intelligence of nature. It considers that the nature of living beings and their ac-



tions is defined by a purpose, an active principle and an energy conservation principle which are integrated following the rules of the supplementation law (between the purpose and the active principle) and the complementation law (between the purpose and the energy conservation principle).

The ontology of a functional aspect of reality is unique, being therefore timeless and cross-cultural. Its application integrates unicist ontology, with unicist logic and the unicist ontology of evolution.

Things in real life might have different functionalities. Each of these functionalities has its ontology. For example, the same type of boat can be used as a fishing boat or a survival boat. A fishing boat has “one” ontology and the survival boat has another.

## Human Complex Adaptive Systems

Human individual, institutional, businesses and social behavior are also paradigmatic complex adaptive systems. The application fields of the unicist approach to complexity science are the human complex adaptive systems.

### Examples of Human Complex Adaptive Systems:

#### Cultural Behavior and Archetypes

Cultures have to be considered as a unified field, which implies that they have a structure of taboos, utopias and myths to face the external reality in a defined way that has to be considered as a limit for any human complex adaptive system.

#### Economic Models

As economic models have to be redundant with the social values included in a cultural archetype, the use of non-consistent economic rules will produce paradoxical effects because it cannot be recognized as valid.

#### Educational Models

One of the objectives of an educational model is to socialize people’s behavior making it consistent with a cultural archetype. The introduction of alien educational models produces necessarily paradoxical results.

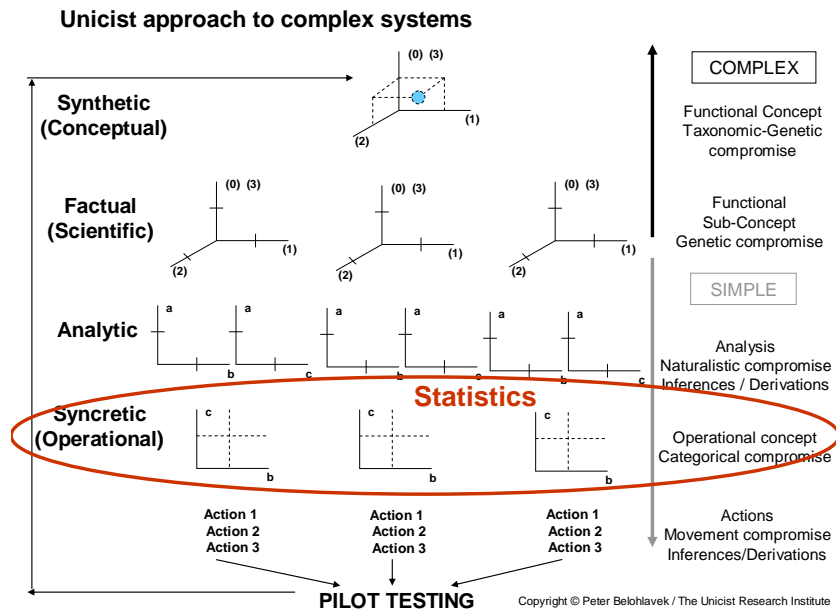
#### Businesses

Businesses are, by definition, complex systems that need to deal with the market, going beyond the present boundaries of the activity. Therefore they need to be defined considered as part of the unified field of the market they work with.

#### Conscious Personal Development

Personal evolution depends on the capacity of individuals to adapt to the environment they decided to live in. Thus it depends on the individual’s capacity to apprehend the unified field of that environment and influence it.

## Necessary Compromises to Manage Complex Adaptive Systems



The generic approach:

- 1) Human adaptive systems are in permanent motion. To establish a fixed point based on their oneness the ontological structure needs to be discovered. This definition includes limiting the boundaries of the system.
- 2) A taxonomic-genetic compromise needs to be done to transform the oneness into the elements that integrate its ontogenetic structure.
- 3) A genetic compromise is needed to deal with the sub-ontologies or objects included in the ontogenetic structure.
- 4) A naturalist compromise is necessary to divide the objects of the ontogenetic structure into the double dialectical elements and make the consequent inferences on their behavior.
- 5) A categorical compromise needs to be done to define the ontological categories at an operational level.
- 6) A motion compromise has to be done to define the actions that allow influencing the adaptive system.

This approach implies transforming a human complex adaptive system into a manageable system making the necessary compromises to transform its oneness into operational actions to generate results.

The knowledge of an ontological structure of a unified field defines the existence of the possibility to exert influence on it. Mathematically, a possibility exists or not (1 or 0). The success of influential actions belongs to the field of probabilities because of the multiple compromises that have been done.

## The Use of Statistics in Complex Problem Solving

Statistics are only valid if the “variables” they manage describe the ontological structure of a reality. This means that the knowledge of the ontology of a complex problem must pre-exist before statistics can be used.

From an ontological point of view statistics are necessary to enter at an operational concept level to define the sizes of the segments that might be relevant.

## Comparison of the Approaches to Complexity Sciences

Aspect	Peter Belohlavek's approach to Complexity Sciences (*)	Preexisting approaches: Bateson, Förster, Lorenz, Maturana, Morin, Prigogine and others
Field of Study	Complex adaptive systems	Complex adaptive systems
Approach	Pragmatic - Structural - Functionalist	Empirical
Definition of the field of study	A specific reality as a unified field that includes the restricted and wide contexts and the emergence of the system	Based on the emergence of the system
Possibility of external observation	Inexistent	Inexistent
Research method	Unicist Ontological Research	Systemic research
Boundaries of the system	Open	Open
Self-organization	Concepts – analogous to strange attractors	Strange Attractors / undefined
Structure	Double Dialectics Dynamics Purpose - active function - energy conservation function	Variables
Relationship between the elements	Following complementation and supplementation laws	Undefined
Evolution / Involution	Based on the evolution/involution laws of the ontogenetic intelligence of nature	Undefined
Processes	Object driven processes	Undefined
Certainty	Dealing with possibilities and probabilities	Dealing with probabilities
Demonstration	Real applications	Real applications
Emulation in mind	Double dialectical thinking (using ontointelligence)	Complex thought
Emergence	Results	Results
Chaos	Inexistent	Existent
Influence on the system	Based on actions and driving, inhibiting, entropy inhibiting, catalyzing and gravitational objects.	Based on actions
Validation	Destructive and non-destructive tests (real applications)	Systemic research validation methods

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