Linguistic Analogy for Process Innovation

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Why Linguistics?
They have same kind of problems

How to keep balance between Process change & System structure
Issue of Change

Software changes over time adapting itself to operating environment

Language changes also
Issue of Structure

Structure of software system
Looks like somehow stable
But .....?

Language has
Similar problems also
Original meaning of the word "System"

Sy: Together
Stem: To place something

What is the relationship Among things placed together?
What is the system?

Any system represents Designer’s conceptual view To see relationship among things as such a system
About Conceptual Design
Linguistic Turn

It was a major development in Western Philosophy in early 20th century.

Ludwig Wittgenstein is considered as one of the ancestors of this movement in Vienna.
Wittgenstein Said:

The world is not a simple collection of objects.
It should be considered as a set of facts – namely states of affairs which do exist.
Language and World

Human beings has created numerous imaginary worlds by using various symbols (languages).

Not from nothing, just make change existing world into new VERSION.

- Nelson Goodman
Ways of Workdmaking

5 logical steps
(1) Composition / Decomposition
(2) Weighting
(3) Ordering
(4) Deletion and Supplementation
(5) Deformation
Software

Imaginary machine written in some language implementing a model of the target world. As such, it is not created from nothing. Just a new version of world based upon older ones. Innovation can happen at any logical step.
Issue of Change in Language
20th Century Linguistics

Ferdinand de Saussure

Unique dichotomic approach:
Parole vs Langue
Signifie vs Signifian
Diachrony vs Synchrony

Structural Linguistics after Saussure
Study of static structure in
Synchronous mode of language
Eugenio Coseriu
a Rumanian Linguist

It is wrong to look for external reasons of change based upon hypothesis that language should be unchangeable for a while.

We should think that change is the essential nature of language.
Language as a Tool

Language is given to us as a tool of communication and thinking. It is not restricting our activity. If we feel some inconvenience, we can easily change it. The reason for change is not outside, it is inside of our mind.
Software is also a Tool

It is just given to us as a tool to support our information processing activity.
If feeling some inconvenience, anybody can change it to fit to using environment.
That is the reason of change.
Software Evolution Process

As prof M.M. Lehman pointed out in his theory of "software evolution dynamics", the process of software evolution is considered as a "multi-level, multi-agent and multi-loop feedback system."
More Realistic Picture

- Previous diagram a **fiction**
- More **realistic** picture
- Process **not** **sequential**
- Not just **technical development**

Global process, in general, a **multi-level** **multi-loop** **multi-agent feedback system**
Maelstrom

All the people (developers, managers, users, SPI staffs, and even researchers) are involved in this maelstrom of software evolution. It is impossible to imagine a birds-eye view, we need to construct an inside view of the maelstrom for the basis of future innovation.
Impossible View of Software Evolution
Historical Change of Human Discourses
Nakamoto TOMINAGA
(1715-1746)

1. Setsu-Hei （説弊）
   (Philosophical Obscurantism)
2. Okina-no-Fumi （おきなのふみ）
   (Testament of an Oldman)
3. Shutsu-Jou-Kou-Go (出定後語)
   (Words after Enlightenment)
Nakamoto TOMINAGA  
(1715-1746)

- One of young philosopher in KAITOKUDO school
- Published 3 controversial books on philological analysis of classics of Confucianism and Buddhism.
Nakamoto’s Work

1. Setsu-Hei （説弊）
   (Philosophical Obscurantism)
2. Okina-no-Fumi （おきなのふみ）
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   (Words after Enlightenment)
Principle of Ka-Jou
Transformative Accretion

Chronological analysis of evolution of Confucianism and Buddhism reveals that:

Any new discourses add some new idea to beat older ones.
Principle of San-Butsu-Go-Rui
3 Factors and 5 Categories

3 Factors:
Who (Person), When (Time) and Context (Rhetoric)

5 Categories (Rhetorics)
Expansion, Inclination, Afloat, Limitation, and Irony
How about innovations in software so far?

Evolution of various software design methods

Change of the people’s concern about “process”
Reference


Thank you!