

# 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



# 20<sup>th</sup> Century Linguistics

Ferdinand de Saussure

Unique dichotomic approach:

Parole vs Langue

Signifié vs Signifiant

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.

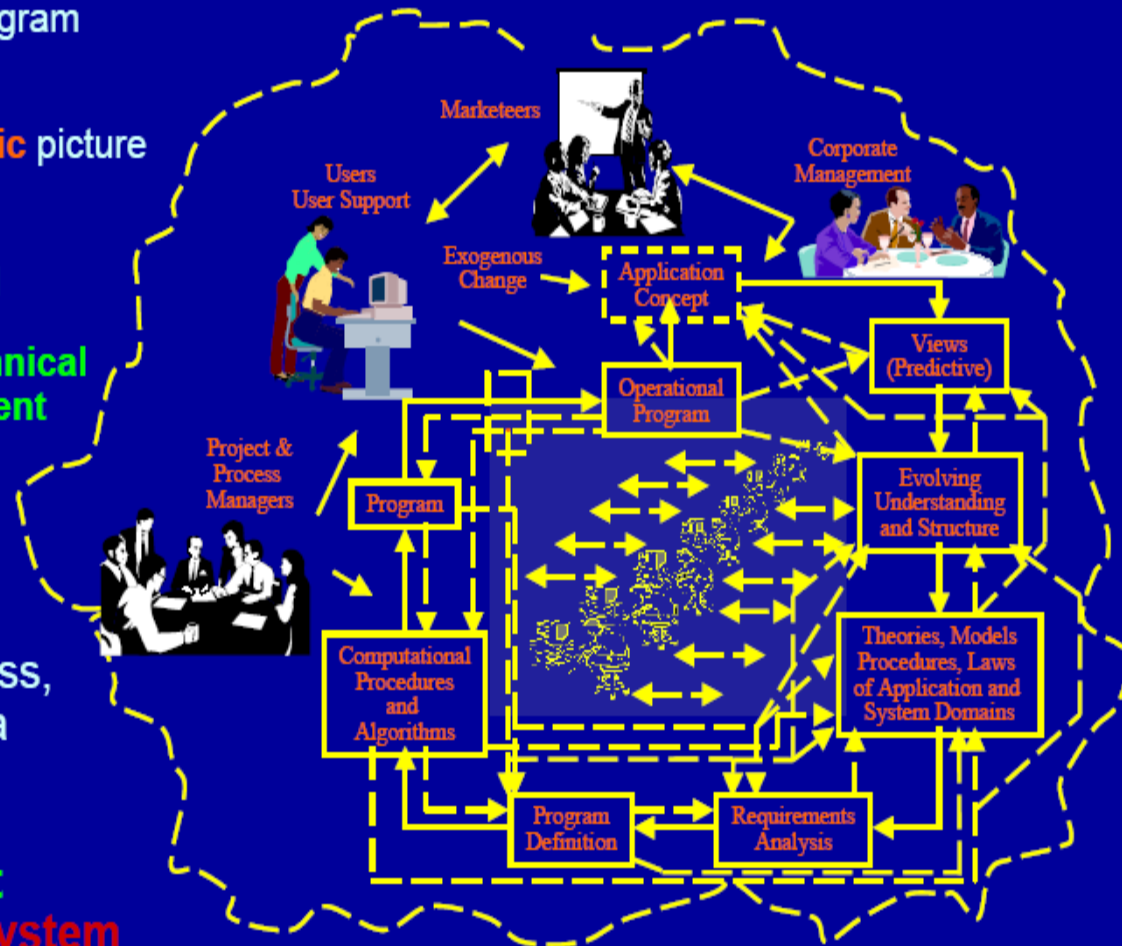
# Software Evolution Process

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**

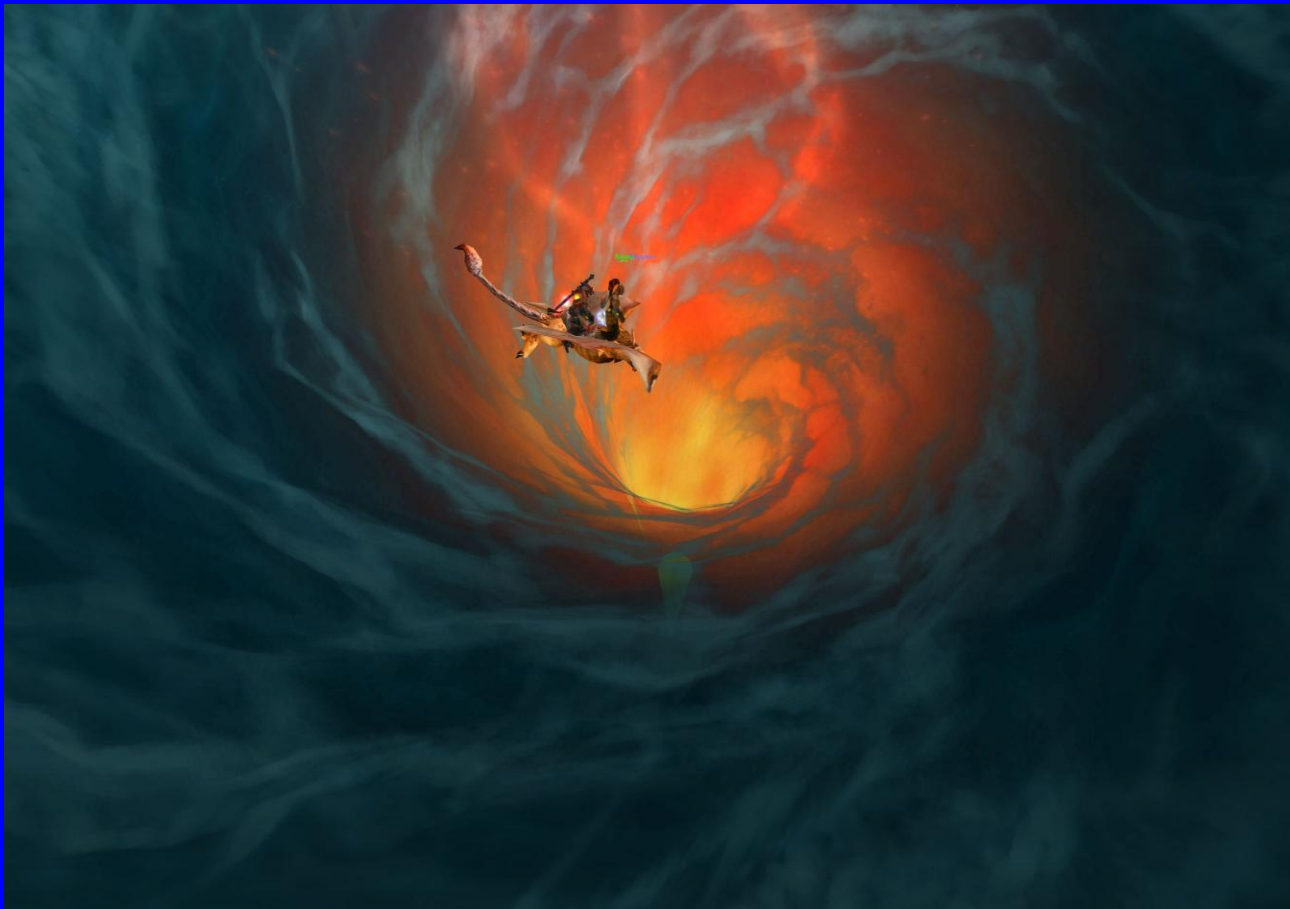


# Maelstrom

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 (おきなのおふみ)  
(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)
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# 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



- Nelson Goodman: "Ways of Worldmaking", Hackett, 1978.
- Eugenio Coseriu: "Sincronia, Diacronia e Historia", Madrid, 1973.
- Tesuo Najita: "The Kaitokudo: Merchant Academy of Osaka – Visions of Virtue in Tokugawa Japan", The University of Chicago Press, 1987.

Thank you!

