

## Jan L.G. Dietz

Emeritus professor in Computer Science at TU Delft

Professor in Enterprise Engineering at Antwerp Management School

Chairman Enterprise Engineering Consortium

Director Sapio Enterprise Engineering







## A 'user' experience of ERP

A man got a purchase order form, containing the next text:

Product name: guest lecturer LAR 26309, 80 x €55,00
Quantity: 1
Price per unit: 4400,00 EUR
Delivery address: University Wageningen, Building 101, goods receiving DOW
Mention purchase order number on packing note and invoice.

The man thought: would this be my promised guest lecturer contract? So he replied:

"Thanks for the order with the above mentioned purchase order number. The requested product 'guest lecturer LAR 26309' is ready for delivery. Delivery will take place in parts, without packing note"



Introduction and problem definition

Introduction to Enterprise Engineering

The PSI-theory

The genotype and phenotype of organisations

The BETA-theory

Conclusions



### **Introduction and problem definition**

Introduction to Enterprise Engineering

The PSI-theory

The genotype and phenotype of organisations

The BETA-theory

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## What is an Enterprise Information System?

### (Wikipedia)

An enterprise information system (EIS) is any kind of information system that improves the functions of an enterprise business processes by integration. This means typically offering high quality of service, dealing with large volumes of data and capable of supporting some large and possibly complex organisation or enterprise.

#### (My definition)

An enterprise information system (EIS) is an information system that supports the operational activities in an enterprise in an integral way.



## What is an ERP system?

#### (Wikipedia)

Enterprise resource planning (ERP) is business management software —usually a suite of integrated applications—that a company can use to store and manage data from every stage of business, including product planning, cost and development, manufacturing, marketing and sales, inventory management, shipping and payment.

#### (My definition)

An ERP-system is an enterprise information system that is based on the reference model of enterprise resource planning (originally developed for manufacturing companies).



EISs, notably ERP-systems, are rarely a real success, i.e. they do not meet user expectations

The key problem is not the engineering of the EISs, but the identification of the user expectations

What users expect from an EIS is that it supports them in all of their activities, in all situations

These user needs can not be found out by just making enquiries. This would resemble a medical doctor asking a patient to do the diagnosis!

They can however be found out by basing enquiries on the proper and profound understanding as offered by enterprise engineering

Only then can completeness and relevance be guaranteed



Introduction and problem definition

**Introduction to Enterprise Engineering** 

The PSI-theory

The genotype and phenotype of organisations

The BETA-theory

Conclusions

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## The discipline of Enterprise Engineering

Enterprise Engineering (EE) is the scientific discipline in which enterprises are considered to be designed systems, which consequently can be re-designed. This is a radically new paradigm!

EE is built on three foundational pillars:

Enterprise Ontology Enterprise Architecture Enterprise Governance

**Enterprise Design** 

94% of inadequate enterprise performance is the **inevitable** result of how enterprises are **designed**.

William Edwards Deming

# The generic goals of Enterprise Engineering

## • Intellectual manageability

 In order to bring about organisational changes, one needs to have insight and overview. This implies a well devised systematic reduction of complexity (*Enterprise Ontology*)

### Organisational concinnity

For an enterprise to be a coherent and consistent whole, its parts must be arranged in a skillful and harmonious way.
 This implies well devised design (*Enterprise Architecture*)

## Social devotion

 Enterprise Engineering takes a human centered view on organisations. This implies a well devised distribution of authority and responsibility (*Enterprise Governance*)

From: J.L.G Dietz, J.A.P. Hoogervorst et al.: The Discipline of Enterprise Engineering, in: IJODE Vol. 3, No. 1, 2013



## **The CIAO! Network**







**CTU** Prague



Research Almaden, USA



**Delft University of Technology** 



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#### **Ideological Theories**

*selecting the things to make* **politics** EE-theories: σ-theory

#### **Technological Theories**

designing and making things analysis and synthesis EE-theories β-theory, v-theory

#### **Ontological Theories**

understanding the nature of things and their use explanation and prediction

EE-theories:  $\phi$ -theory,  $\delta$ -theory,  $\pi$ -theory,  $\psi$ -theory,  $\tau$ -theory

#### **Philosophical Theories**

*understanding thinking* epistemology, mathematics, phenomenology, logic EE-theories: ω-theory



Introduction and problem definition

Introduction to Enterprise Engineering

**The PSI-theory** 

The genotype and phenotype of organisations

The BETA-theory

Conclusions

## Ontological theories: the $\psi\text{-theory}$

The  $\psi$ -theory ( $\psi$  is pronounced as PSI, standing for Performance in Social Interaction) is a theory about the ontological essence of social systems. It clarifies and explains the construction and operation of organisations.

The  $\psi$ -theory is rooted in the  $\pi$ -theory, speech act theory [Austin, Searle], social action theory [Habermas], systemic ontology [Bunge] and information systems theory [Langefors]. It consists of two parts: the general  $\psi$ -theory and the special  $\psi$ -theory.

The **general**  $\psi$ -theory is a theory of human cooperation. Therefore, it is also called the human face or front side of the  $\psi$ -theory.

The **special**  $\psi$ -**theory** clarifies the consequences of the general  $\psi$ -theory for the systems approach to organisations. Therefore, it is also called the **system face** or **back side** of the  $\psi$ -theory.



The operating principle of organisations is that **subjects** (humans) enter into and comply with commitments

Commitments are raised and dealt with in **transactions**. These are interaction structures of **coordination acts/facts** regarding a **production act/fact** between two actors: one of them is the **initiator** (consumer) and the other one is the **executor** (producer)

The effect of a coordination act is the creation of a coordination fact, which is a state change in the **coordination world** of the organisation

The effect of a production act is the creation of a production fact, which is a state change in the **production world** of the organisation





These state changes occur according to the universal transaction pattern. Did you see the pattern?

The complete transaction pattern



The complete transaction pattern



The complete transaction pattern



The complete transaction pattern



## The organisational building block

An **actor role** is the authority to be executor in exactly one transaction kind. It may be an initiator in 0, 1 or more transaction kinds.

A subject may fulfill several actor roles (sequentially or simultaneously), and an actor role may be fulfilled by several subjects (sequentially or simultaneously or collectively).





An actor A0 (the initiator of T1) comes to agreement with an actor A1 (the executor of T1) about the delivery of a product P1.

Basically, A0 doesn't need to care about what A1 has to do in order to produce P1.

At some point in time, A1 addresses A0 and performs the state act in the transaction T1.



#### In order to produce P1, A1 needs a P2, a P3 and a P4! And ...

NOTE: component transactions may also be carried out in parallel.



The special  $\psi$ -theory takes the systems approach to organisations. Being the back side, PSI is read backwards (ISP), with two meanings:

### **Intelligent System Partitioning**

Every organisation can be partitioned in three aspect organisations:
B-organisation (B from Business)
I-organisation (I from Information)
D-organisation (D from Document and Data)

### **Integrated System Perspectives**

The ontological model of an organisation is the integration of four sub models: Construction Model, Process Model, Fact Model, and Action Model





## What is the essential model? (1)

The **essential model** of an organisation is the ontological model of its **B-organisation**:

abstracted from **realisation**: from the **I-organisation** from the **D-organisation** 

abstracted from **implementation**: from **coordination technology** from **production technology** 





business rules work instructions

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By abstracting from realisation and implementation (of the Borganisation), a reduction of about 80% is achieved By 'compressing' the complete transaction pattern into one symbol, another reduction of about 80% is achieved In total, this amounts to a reduction of more than 95%!



Introduction and problem definition

Introduction to Enterprise Engineering

The PSI-theory

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Conclusions

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In biology, a distinction is made between the *genotype* and the *phenotype* of organisms





The phenotypes of identical twins may differ considerably (notably in the course of time)

Conversely, people with different genotypes may have quite similar phenotypes.



Also regarding organisations, a distinction can be made between genotype and phenotype

The **genotype** of an organisation is defined as its **essential model** 

The **phenotype** of an organisation is defined as the **realisation** and **implementation** of the essential model

**Realisation** is devising the I-organistion and the D-organisation of the essential model

**Implementation** is allocating technological means to actor roles, and to coordination and production acts/facts





How can I help you, sir? I want to withdraw money From your current account? Yes How much do you want? 400 euro please employee fills out a form If you sign here please client signs the form One moment please promise employee issues banknotes Here you are, sir state Thank you accept

request

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Welcome to the ING bank Please insert your card client inserts card Enter your PIN please client keys the PIN Choose the amount please *client presses* € 400 Take your card please client takes the card Your money is being counted banknotes are produced Take your money please state client takes the banknotes accept

request promise



Introduction and problem definition

Introduction to Enterprise Engineering

The PSI-theory

The genotype and phenotype of organisations

**The BETA-theory** 

Conclusions



The  $\beta$ -theory ( $\beta$  is pronounced as BETA, standing for Binding Essence, Technology and Architecture) is a theory about the design of systems (in any category).

It clarifies and explains such terms as "development", "design", "engineering", and "implementation".

The  $\beta$ -theory is rooted in systems thinking [Bertalanffy, Bunge, Checkland]), in general design theory [Simon], and in software design theory [Dijkstra].







The **enterprise information system** (EIS) of an enterprise is some **implementation** of some **realisation** of its **essential model** 

This insight stresses the intrinsic and intense intertwining of an enterprise information system with the supported organisation

Conclusion: one cannot just deploy some EIS 'from the shelve'!

Instead, proper requirements engineering is needed. Completeness and relevance of the requirements can only be guaranteed if they are based on its genotype: the essential model of the organisation.



an *EIS* vis á vis the *supported organisation* 

is like

a *nervous system* vis á vis the *supported body* 

the *nervous system* is intrinsically and intensely intertwined with the *body* 



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Like every EIS, an **ERP system** is some implementation of some realisation of the **essential model** of some organisation. But which one?

ERP vendors don't seem to know and don't seem to care much.

As a consequence, ERP systems are doomed to fail or to be a life-long 'armour' for the organisation.



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Introduction and problem definition

Introduction to Enterprise Engineering

The PSI-theory

The genotype and phenotype of organisations

The BETA-theory

### Conclusions

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By applying the PSI-theory, one reveals the essential model of an organisation

By applying the BETA-theory, one designs the supporting I-organisation, starting from this essential model

If the implementation technology will be ICT, one can skip the design of the D-organisation.

The resulting EIS will perfectly satisfy the functional requirements of the supported organisation

It will also perfectly fit the operational requirements, i.e. the user interface specifics, because of the complete transaction pattern

Now you know why ERP systems fail ... and will keep failing ... until ERP vendors hire enterprise engineers





j.l.g.dietz@tudelft.nl jan.dietz@uantwerpen.be jan.dietz@sapio.nl

www.ciaonetwork.org www.ee-institute.org www.ee-consortium.com

In this afternoon's tutorial, you will learn how enterprise engineers design EISs