

Perceptions

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Intuitive Perceptions Of Complexity

Perceptions are subjective

Many psychological factors

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Observation Factors

1. Number of discrete parts that are visible
2. Number of relationships among parts that are visible
3. Layout of figures in a diagram
4. Perception of symmetries and other abstract relationships
5. Attention required – focal vs. subsidiary

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Presentation Factors

1. How long an explanation is
2. The number of digressions in an explanation
3. The presence of mathematical or technical language
4. Presenting features rather than function

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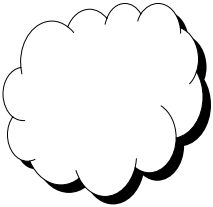
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Presentation Factors

5. Vague descriptions

Perceived as less complex to the person who doesn't care about details



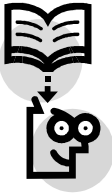
What is imagined is more complex to the person who is insecure about what might be hidden



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Relationship Factors

1. Stereotypes about the person giving the explanation




2. One's knowledge of the subject matter.

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Stress Factors

1. The amount of stress the person is experiencing
2. Perceptions of the complexity of constructing something and of using it tend to commingle.


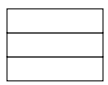
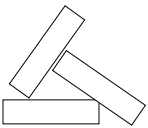


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Confusion Factors

Attributes that may be confused with complexity

 Quantity

 Disorganization  

Obscurity

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Confusion Factors

Attributes that may be confused with complexity

Theoretical

Abstract



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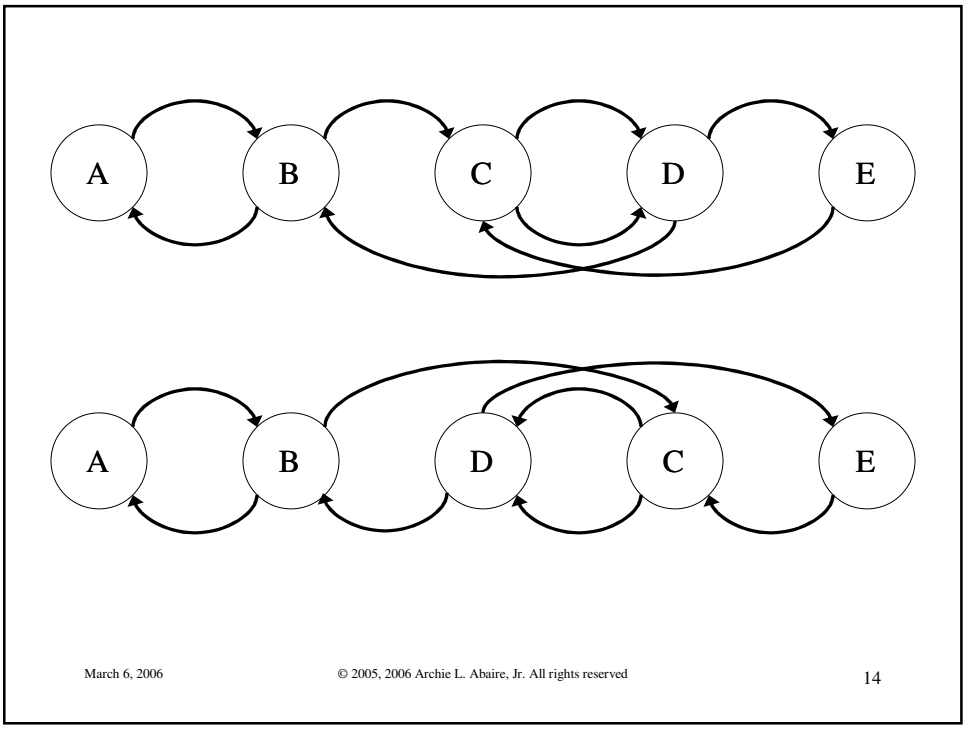
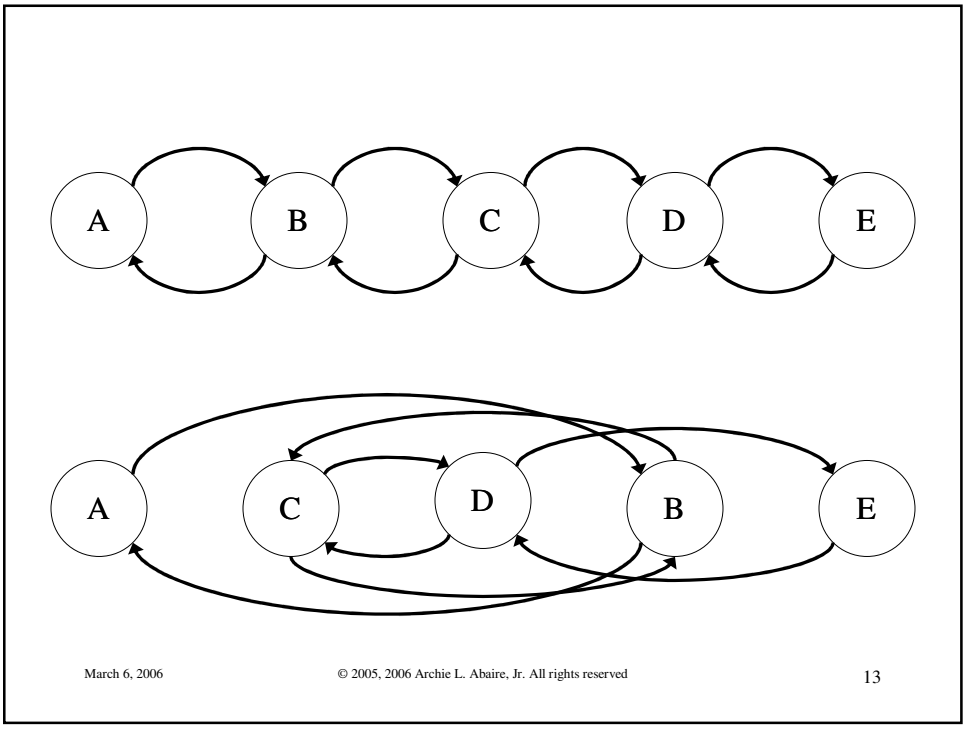
Appearances

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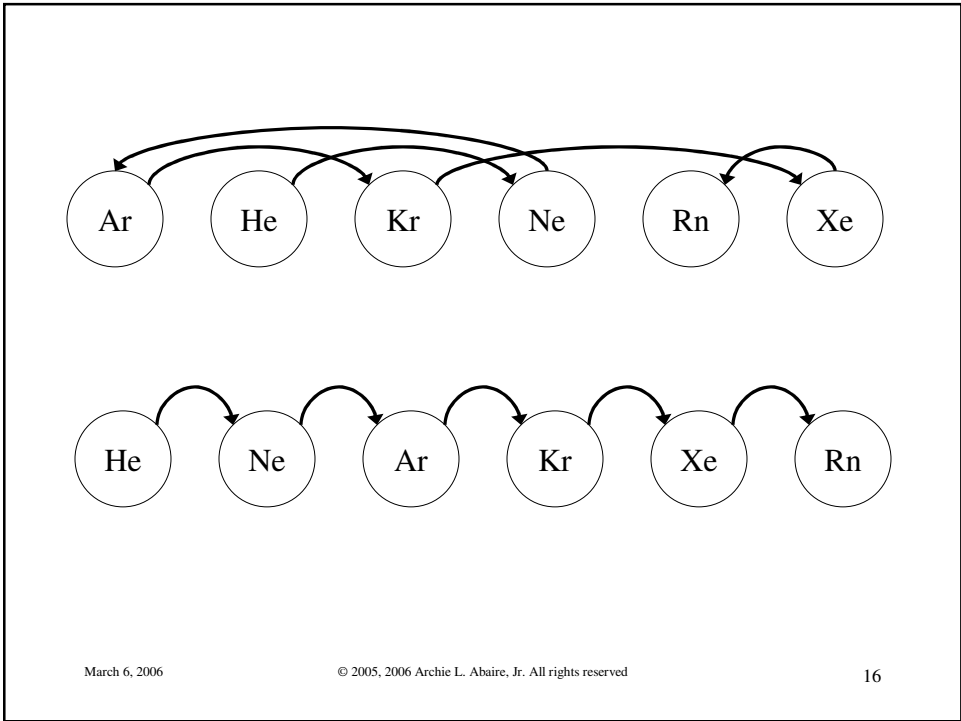
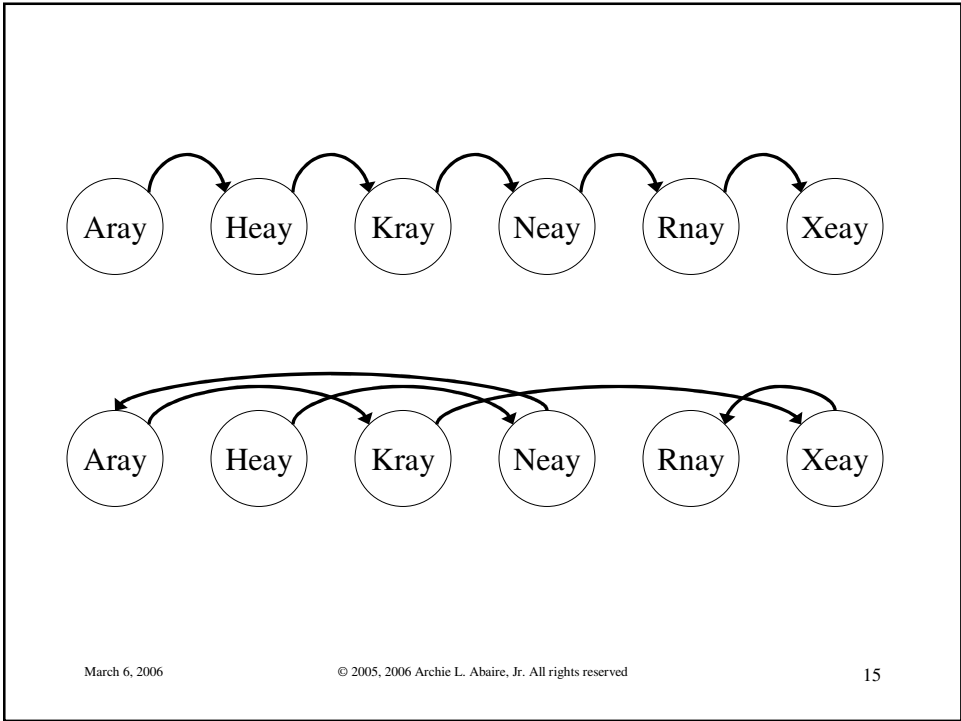
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Managing Business Complexity
Archie Abaire, Circuit City Stores, Inc.



Managing Business Complexity
Archie Abaire, Circuit City Stores, Inc.



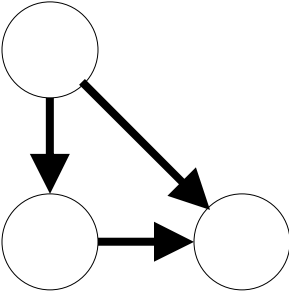
- Lack of conceptual framework makes the previous example almost unintelligible
- For those with a rudimentary knowledge of chemical periodic table, it makes sense.

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Modeling Complexity



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System Model


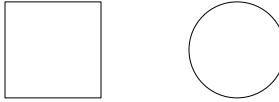
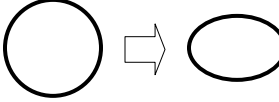
Level 1 – Atomic properties

Level 2 – Composite properties

Level 3 – Scale

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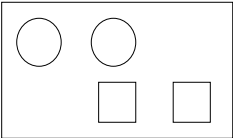
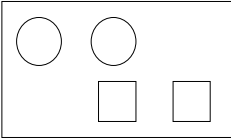
Level 1 – Atomic Properties

The form of a thing	
The substance of a thing (Can be abstract, such as a concept or a rule.)	
The change of a thing (Without regard to the agent of change)	

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Level 2 – Aggregation

Structure



Composition

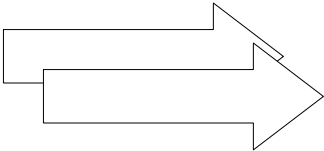
Implies possibility of heterogeneity (form and substance)

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Level 2 – Aggregation



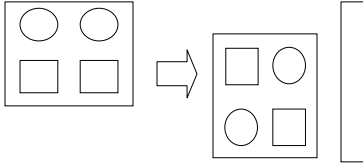
Transformation

Agent of change has relation to thing being changed

The composition and structure can both change

Motion

Implies a frame of reference (external or internal)



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Level 3 – Scale

Scale is the level of detail that is being observed.

Any system generally has at least two levels of scale; the system as a whole, and the components of the system.

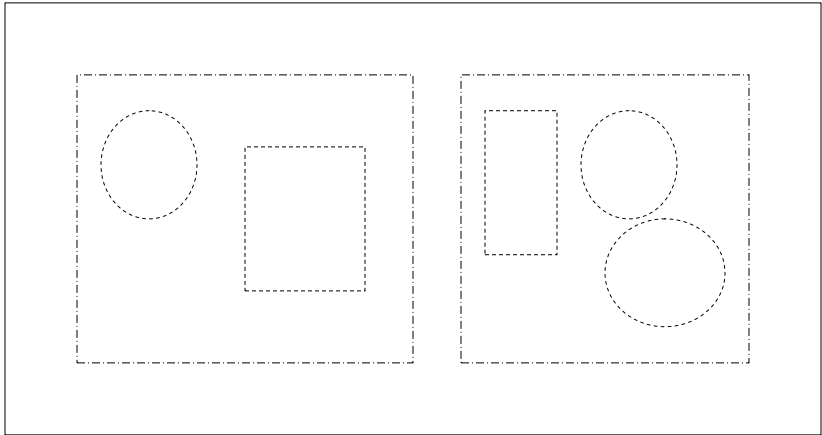
A thing may be considered an aggregation or an atomic element, depending on scale

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Scale



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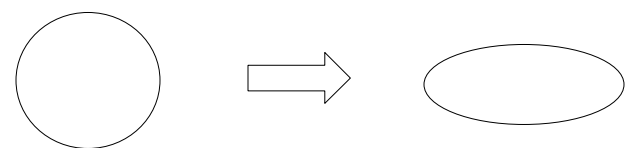
Example Of Level 1 Properties

A ball

Form is spherical

Substance is homogeneous rubber

Change is deformation



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Example Of Level 1 Properties

A sale transaction

Form is legal contract

Substance is the particular terms

Change is ownership



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Example Of Level 2 Properties

A tennis game

Composition includes the ball, players, fence, lines on the court, and net

Structure is the arrangement of the physical components, and also the rules of the game

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Example Of Level 2 Properties

Transformation is the process that imparts kinetic energy to the ball

Motion is the movement of the ball and the people in relation to the court

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Example Of Level 3 Properties

Computer hardware

Desktop computer

Components (RAM, CPU, disk drive, etc.)

Subcomponents (capacitors, integrated circuit chips)

Arrays of microscopic transistors

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Example Of Level 3 Properties

Data

Data warehouse

Database tables and stored procedures

Physical files on disk

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Measurement

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Quantity Measures

May include the following:

Cardinality – how many
[integer]

Magnitude – position on a
continuous scale [real number]

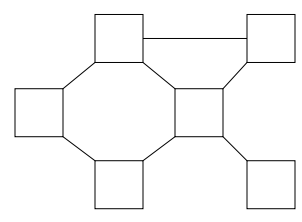
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Quantity Measures

Number of objects
(graph theory “order”)

Number of connections
among objects
(graph theory “size”)

Number of connections to an object
(graph theory “degree”. In other contexts,
the term “order” is used to mean this.)



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Quantity Measures

Number of symmetries

Number of kinds of symmetries

Number of kinds of objects

Number of kinds of connections

Scale levels – e.g. database, table, row, data
element

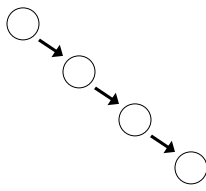
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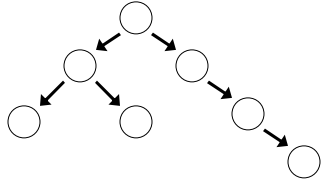
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Arrangement Measures

Position in an unbranched hierarchy – order



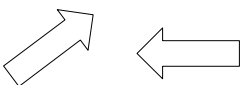
Position in a branched hierarchy – partial order



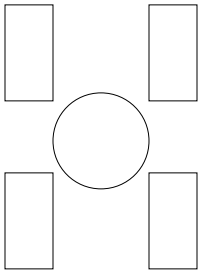
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Arrangement Measures

Direction



Symmetry



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Definition of Complexity

Complexity is a *quasi-measurable compound* property of systems that manifests itself in three layers:

- 1) atomic properties of form, substance, and change
- 2) aggregate properties of structure, composition, transformation, and motion
- 3) scale.

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Where is complexity located?

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Complexity Grid

Necessary Business Complexity	Unnecessary Business Complexity
Necessary IT Complexity	Unnecessary IT Complexity

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Unavoidable Business Complexity Sources

Products or services (manufacturing, distributing, marketing, personnel, etc.)

Compliance with external regulators (taxes, regulatory agencies, municipal codes, labor, finance, etc.)

External environment (competition, economic conditions, etc.)

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Unavoidable IT Complexity Sources

Infrastructure (technology layers, multiple vendors, etc)

Project management (has impact on final product)

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Avoidable Complexity Sources

One-off implementation of systems

Politics (turf battles, etc.)

Lack of professional discipline

Poor communication

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Interaction Of Data And Process

In the following simple example, observe how complexity is pushed from processes to data

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Interaction Of Data And Process

The following data is to be used in pull down lists in a GUI.

State codes to be used in completing customer addresses.

ID codes for types of personal ID used as a credential for check payment authorization.

If the credential is a drivers license, the code value is the state code of the state that issued the license.

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Data Structure – Version A

Table: StateCode
Code

Code can be a state code or a code for
military ID, passport, etc.

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SQL For Version A

```
SELECT  
    Code  
FROM  
    StateCode  
WHERE  
    Code not in ('ML', 'PP')
```

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Data Structure – Version B

Table: StateCode

Code

CodeTypeFlag

S = state code

I = ID code

B = Both

Code can be a state code or a code for military ID, passport, etc.

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SQL For Version B

```
SELECT  
  Code  
FROM  
  StateCode  
WHERE  
  CodeTypeFlag in ('S', 'B')
```

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Data Structure – Version C

<u>Table: StateCode</u> Code isStateCode isIdCode
--

Code can be a state code or a code for military ID, passport, etc.

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SQL For Version C

```
SELECT  
  Code  
FROM  
  StateCode  
WHERE  
  isStateCode = 'Y'
```

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Data Structure – Version D

Table: StateCode
Code

Table: IdCode
Code

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SQL For Version D

```
SELECT  
    Code  
FROM  
    StateCode
```

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Complexity is distributed among

- Structure
- Data
- Process

From this viewpoint, the over-all complexity in each of these four examples is roughly the same

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Complexity Intrinsic To The Enterprise

Can be pushed around from one place to another, maybe even out of the IT infrastructure.

Can't be eliminated without losing business functionality

Complexity that is in the wrong place frequently has to be duplicated elsewhere.

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The Organization

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What Are The Challenges?

- Recognize all aspects of complexity
- Identify necessary complexity
- Avoid unnecessary complexity
- Manage perceptions of complexity

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What Are The Challenges?

Most of the challenges that lead to unnecessary complexity are organizational.

The first step is to understand our audience, the business people, better.

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Presentation of Information

- How do IT people tend to come across to business people?
 - Talk technical stuff
 - Don't seem to understand business stuff
 - Not people oriented
 - Too many extraneous details
 - Don't get to the business point

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Presentation of Information

- From an IT perspective, the information being presented is
 - Interesting
 - Well organized
 - Full of relevant information
- For what purpose?

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What To Do

- Present only what is relevant to your audience.
- Extraneous details
 - Make presentations more complex
 - Invite unwanted decisions
- What does your audience need?
 - A catalogue of features?
 - How to perform a task?

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Presentation of Information

- One problem is that presenting more information results in less information being received.
- Reasons
 - Perceived irrelevance
 - Unfamiliarity with concepts
 - Perceived complexity
 - Saturation factor

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Presentation of Information

- 75% to 80% of presentation content should already be familiar to audience
- Provides conceptual framework for the new material
- Audience will not retain what they can't conceptualize
- Perceptual complexity

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Presentation of Information

- Ask three questions about your audience:
 - “What do you want them to remember from the conversation an hour from now?”
 - “What do you want them to remember from the conversation a week from now?”
 - “What do you want them to do with the information?”

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Summary

1. Domains of complexity
 - Technical complexity
 - Organizational complexity
 - Environmental complexity

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Summary

2. Structure of complexity

- **Atomic** level
- **Aggregate** level
- Levels are relative, depending on **scale**

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Summary

3. Observation of complexity

- There is an objective, measurable or quasi-measurable aspect of complexity.
- There is a subjective, perceptual aspect of complexity.

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Summary

4. Some complexity is intrinsic to the enterprise
 - Consequence of essential functionality
 - Complexity can be moved from one place to another

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Summary

5. Work environment
 - Our work environment typically is more complex than what we take into account.
 - We can influence other people's perception of the complexity of our work.

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Questions?

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