FUTURE STRATEGY WITH TRIZ AND BIG DATA TECHNOLOGIES

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1. Introduction & Theory

- Science

"Science is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe" (Wikipedia)
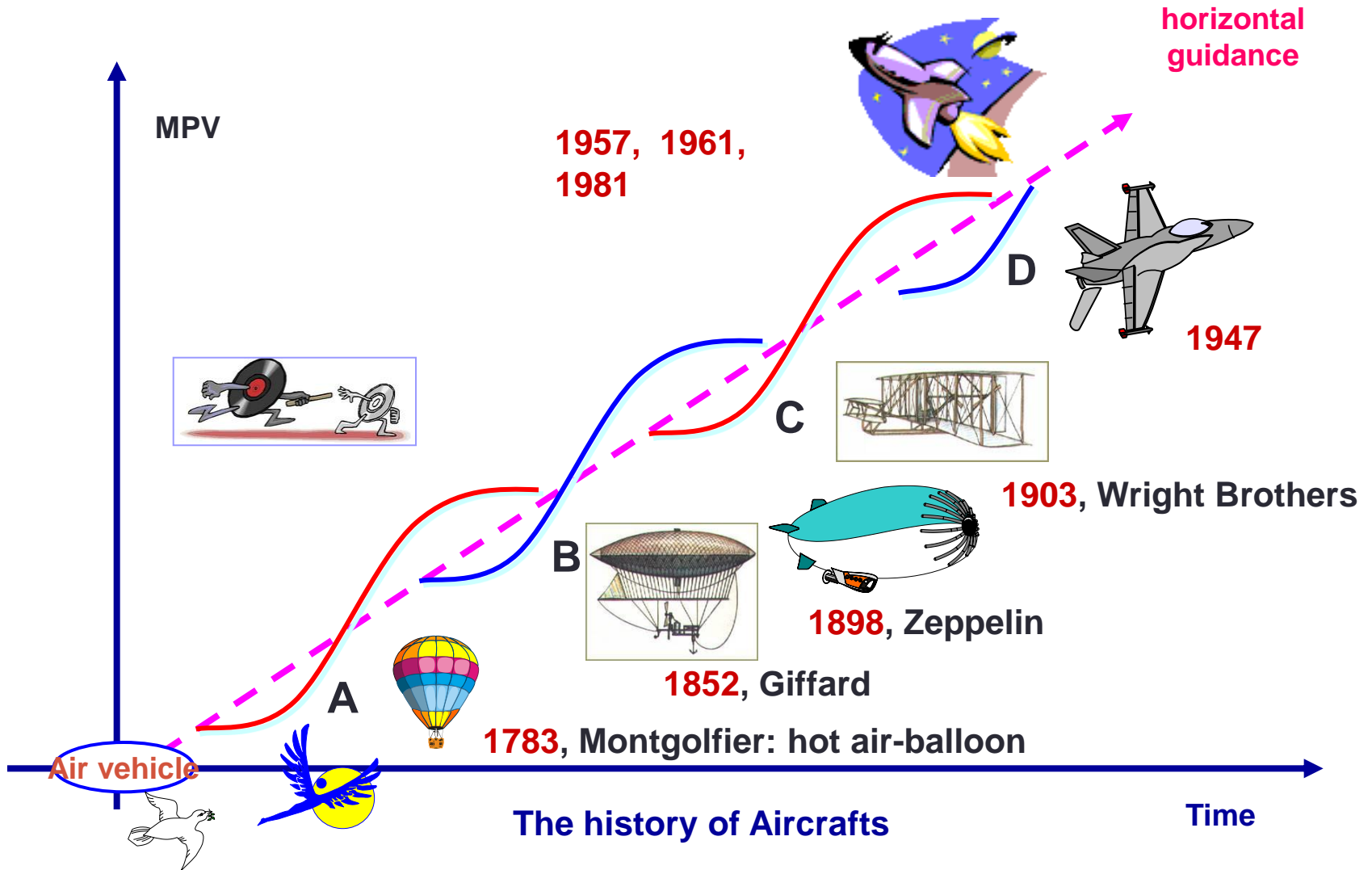
- Evolution

"Evolution is a process of gradual development in a particular situation or thing over a period of time" (Collins Dictionary)

- Charles Darwin(1809-1882)

He formulated the theory of evolution by nature selection, expounded in On the Origin of Species(1859)

(Nature selection: a process by which species of animals and plants that are best adapted to their environment survive and reproduce, while those are less well adapted die out; "survival of the fittest")

Laws(Trends) of Technical System Evolution

horizontal guidance

MPV

1957, 1961, 1981

D

1947

C

1903, Wright Brothers

B

1898, Zeppelin

1852, Giffard

A

1783, Montgolfier: hot air-balloon

Air vehicle

The history of Aircrafts

Time

Laws(Patterns) of Technical System Evolution

- Stages of Evolution(S-curve Development)
- Technical System Completeness
- Evolution toward Increased Ideality
- Non-Uniform Development of System Elements
- Evolution toward Increased Dynamism and Controllability
- Increased Complexity Then Simplification
- Evolution with Matching and Mismatching Elements
- Transition to Micro/Multi-level
- Evolution toward Decreased Human Involvement

Laws(Patterns) of Technical System Evolution

- 1960s – strongest principles from the 40 Innovation Principles set by Genrich Altshuller (Dynamization, Self-service, etc.)

- 1975, spring – the first set of Patterns of Technological Evolution by Genrich Altshuller (Static-Kinematics-Dynamics)

- 1981 – first hierarchical structure (sub-patterns or lines of evolution) by Boris Zlotin

- 1992 – introduction of Directed Evolution® – a method of inventing the future generations of various systems rather then predicting them

- 1999-2014 – transition to the next step – science of controlled evolution of artificial systems
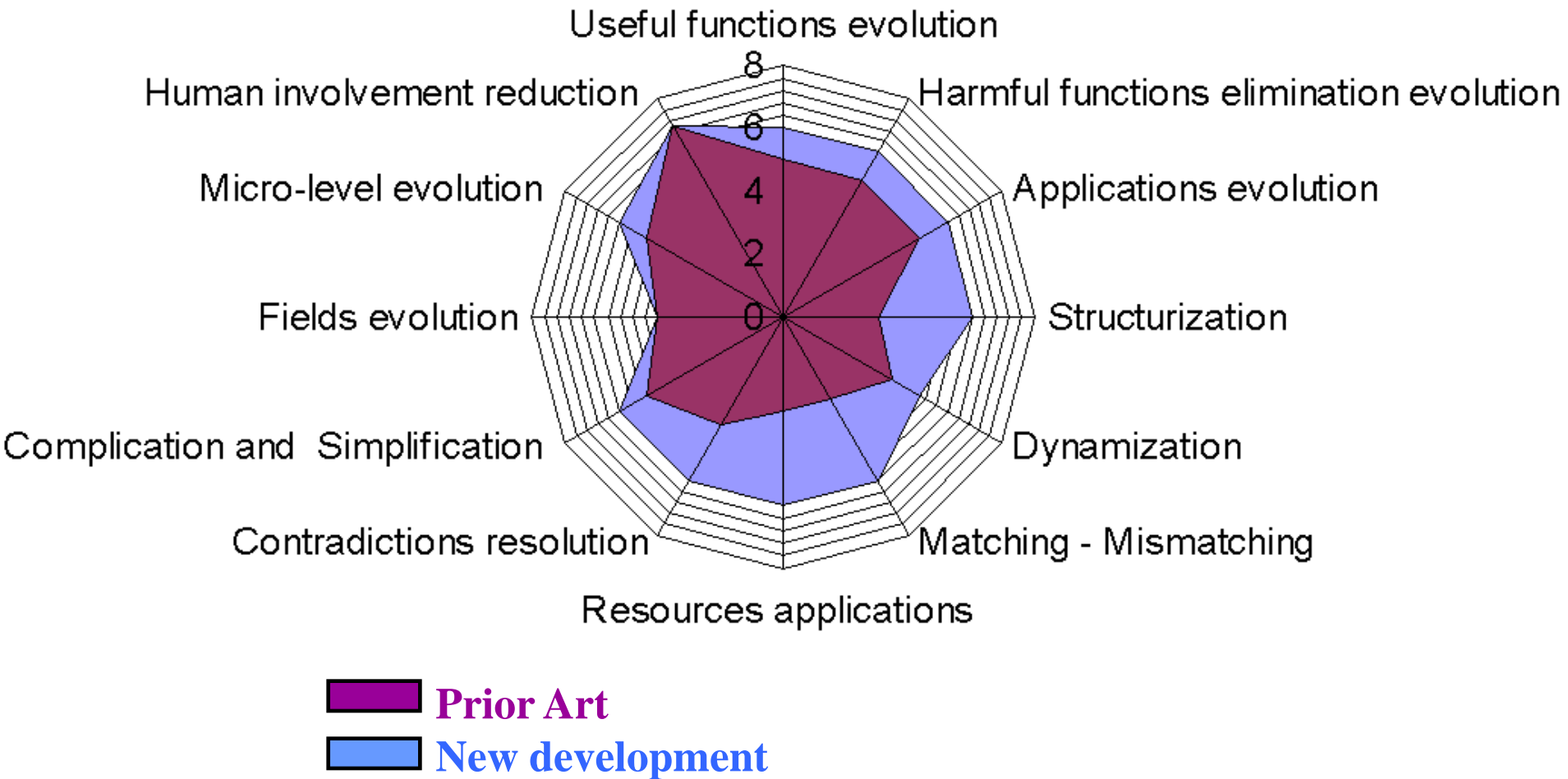
Based on Laws(Patterns) of TS Evolution

- Systems evolve not randomly, but according to objective patterns

- Patterns can be identified based on the analysis of historical development of technology, markets and social trends

- Identified patterns can be purposefully used for system development, avoiding numerous blind trials
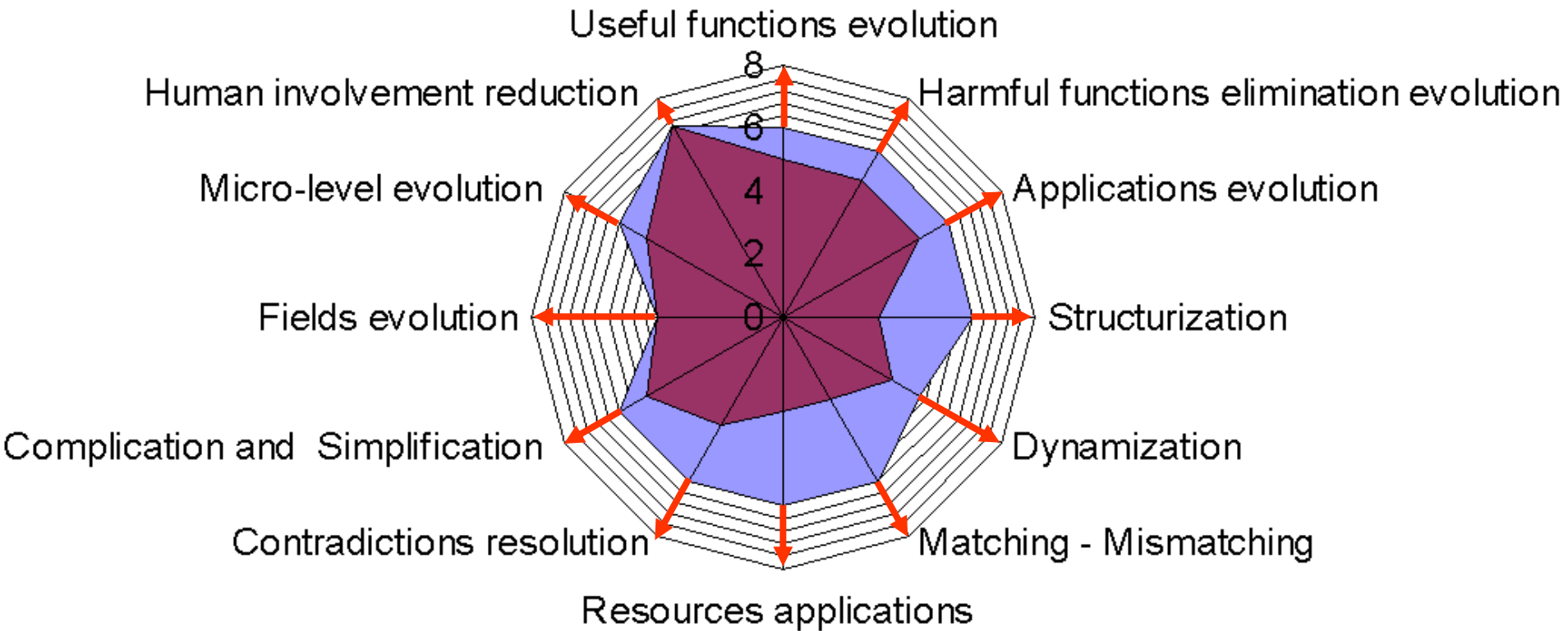
Based on Laws(Patterns) of TS Evolution
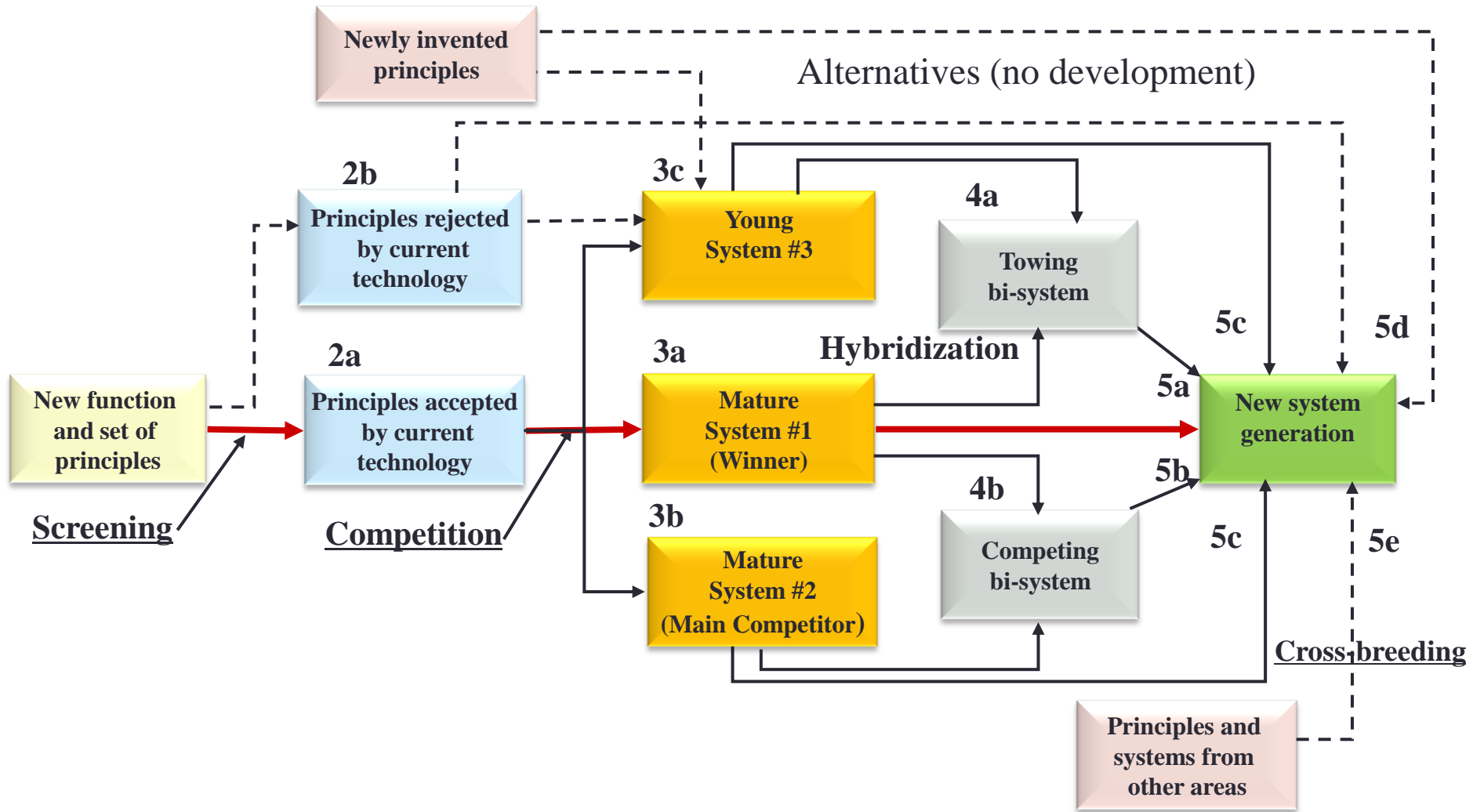
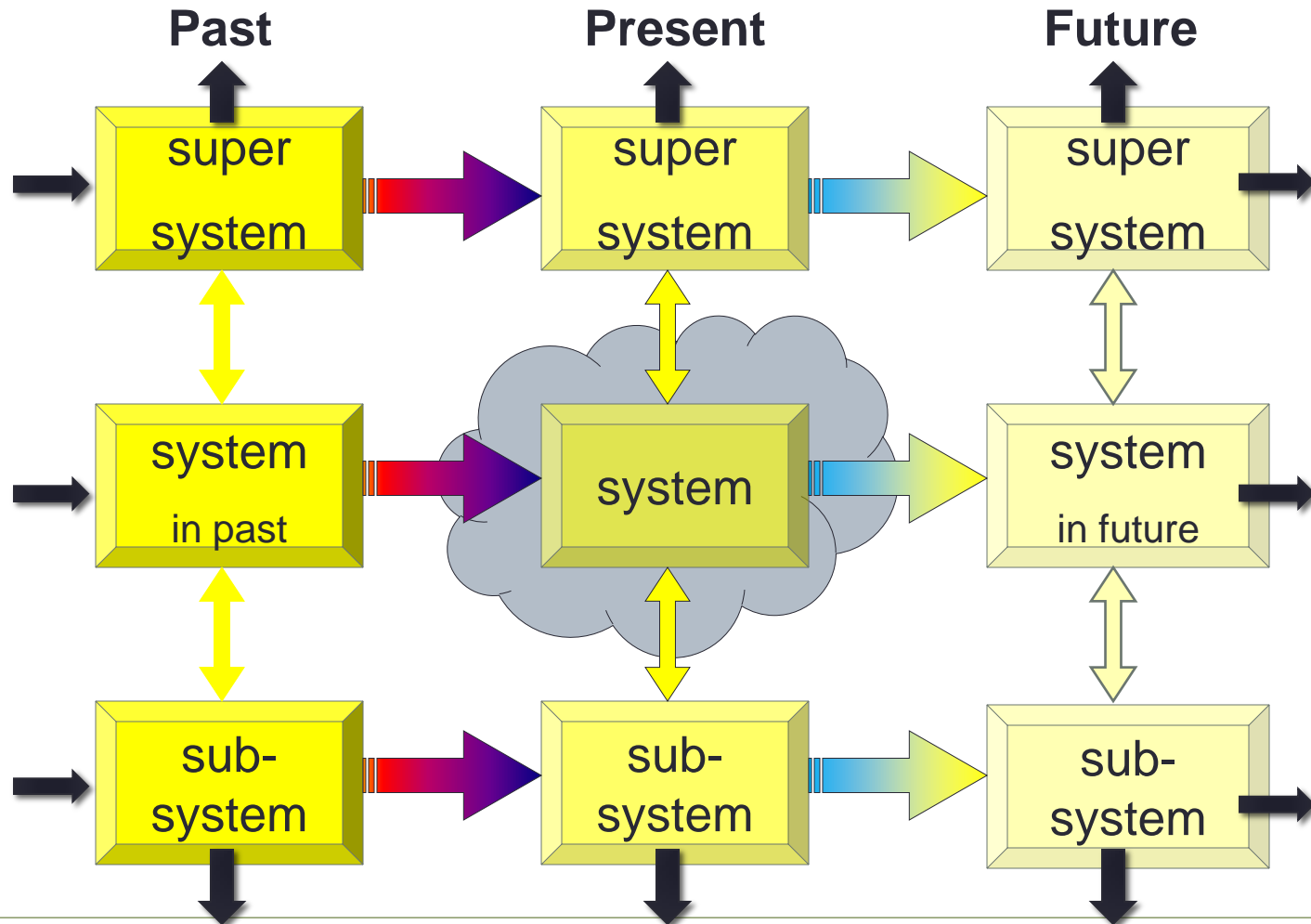# Based on Laws(Patterns) of TS Evolution

Based on Laws(Patterns) of TS Evolution

Based on Laws(Patterns) of TS Evolution

- Methodology and Tools for Managing Future based on structured and controllable creativity

- Systematic process for building a comprehensive set of potential scenarios of evolution of a given system based on patterns and lines of evolution

- Thinking Method for the Informational Era

Based on Trends(Patterns) of Super System

● **System Operator (9-windows)**

Past	Present	Future
super system	super system	super system
system in past	system	system in future
sub-system	sub-system	sub-system

Trends of Super System

- Strong Patterns of Evolution reflect and comply with basic human needs, including:

    ➢ More features for less price (TRIZ Ideality)

    ➢ Convenience and comfort

    ➢ Safety and security

    ➢ Protection of environment

- Every system is a part of a system of higher hierarchical level

- The requirements from the higher level are dominant and force the subordinate system to evolve accordingly

- To invent the successful next generation of a system one should understand the main trends on higher levels

Big Data Technologies
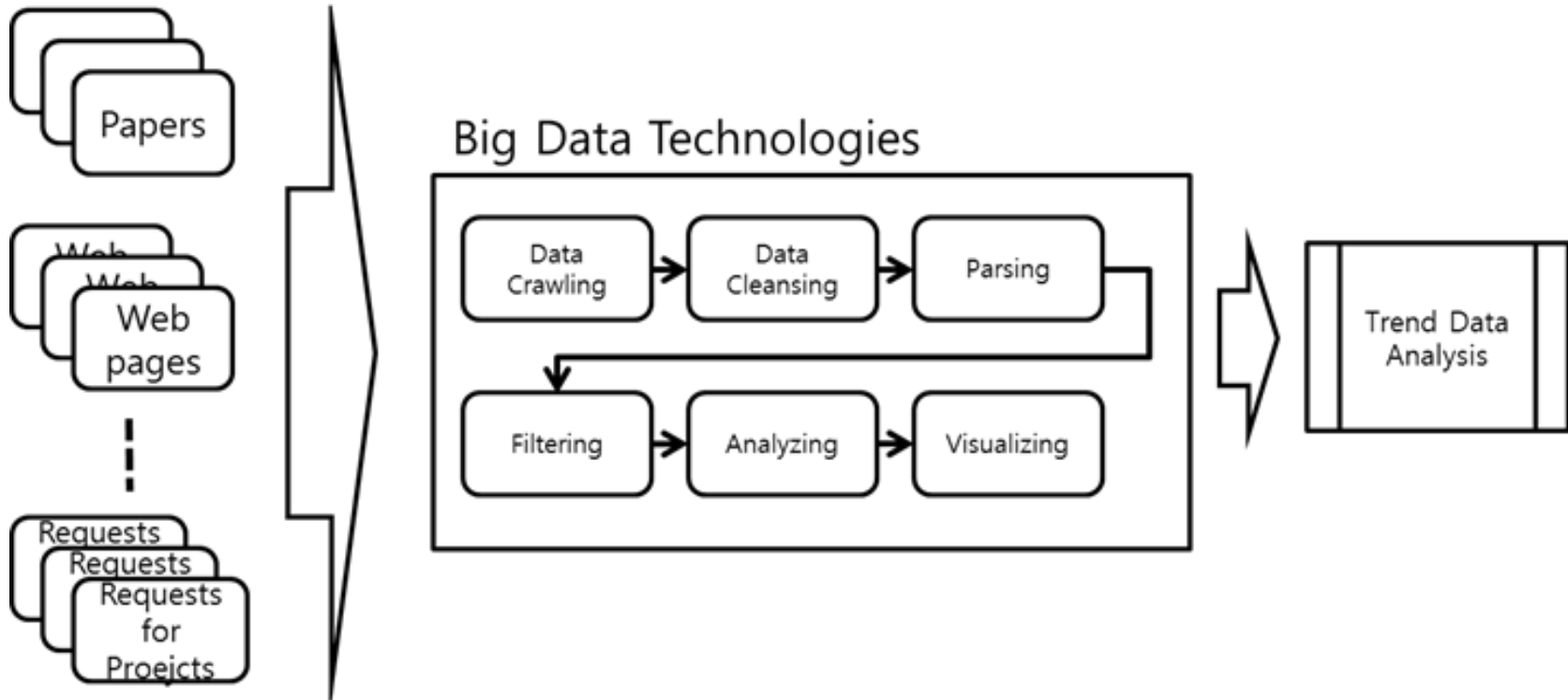
Big Data Technologies

- ## How to Analysis
  - Yearly analyzing the number of papers and patents having technical trend keywords.
  - Extracting keywords with increasing number of appearance in technical documents by year

- ## Database: Google Scholar with advanced searching

- ## Results : Keywords to show new technical trends
  - Personal/Personalized
  - Smart
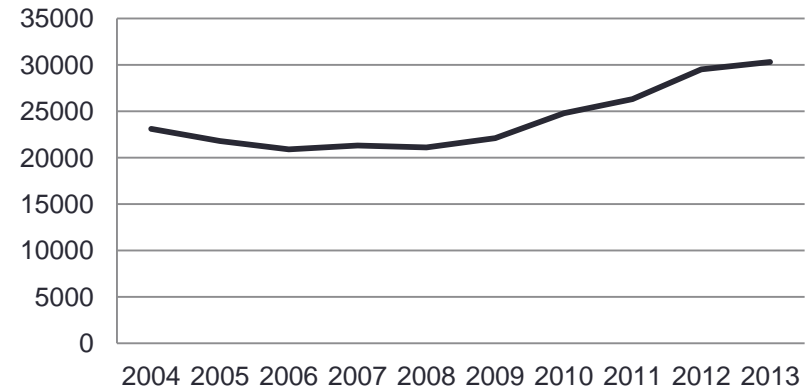 - Customized
  - Human technology/Human Computer Interface

Big Data Technologies

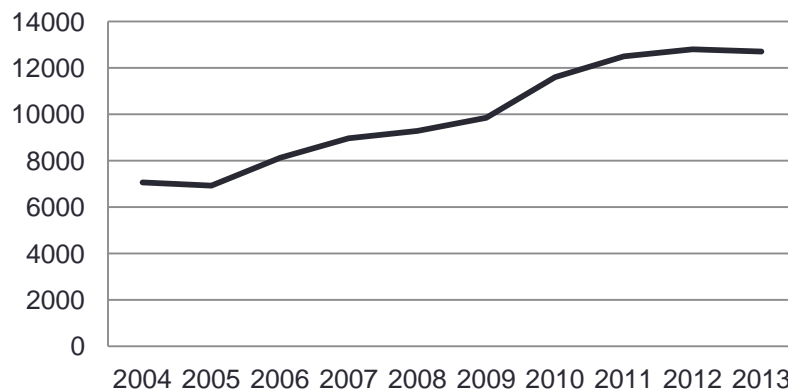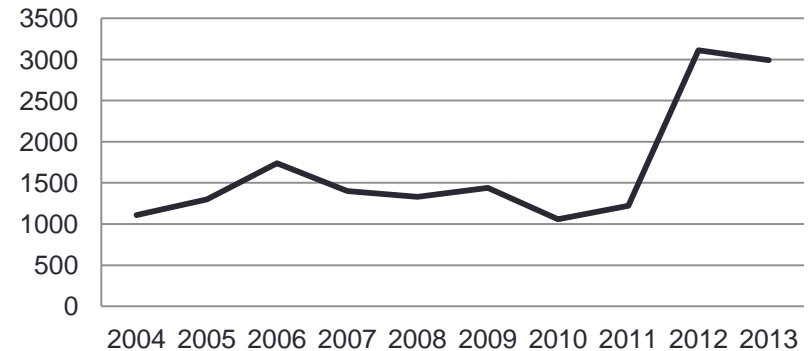- The appearing numbers of the extracted keywords
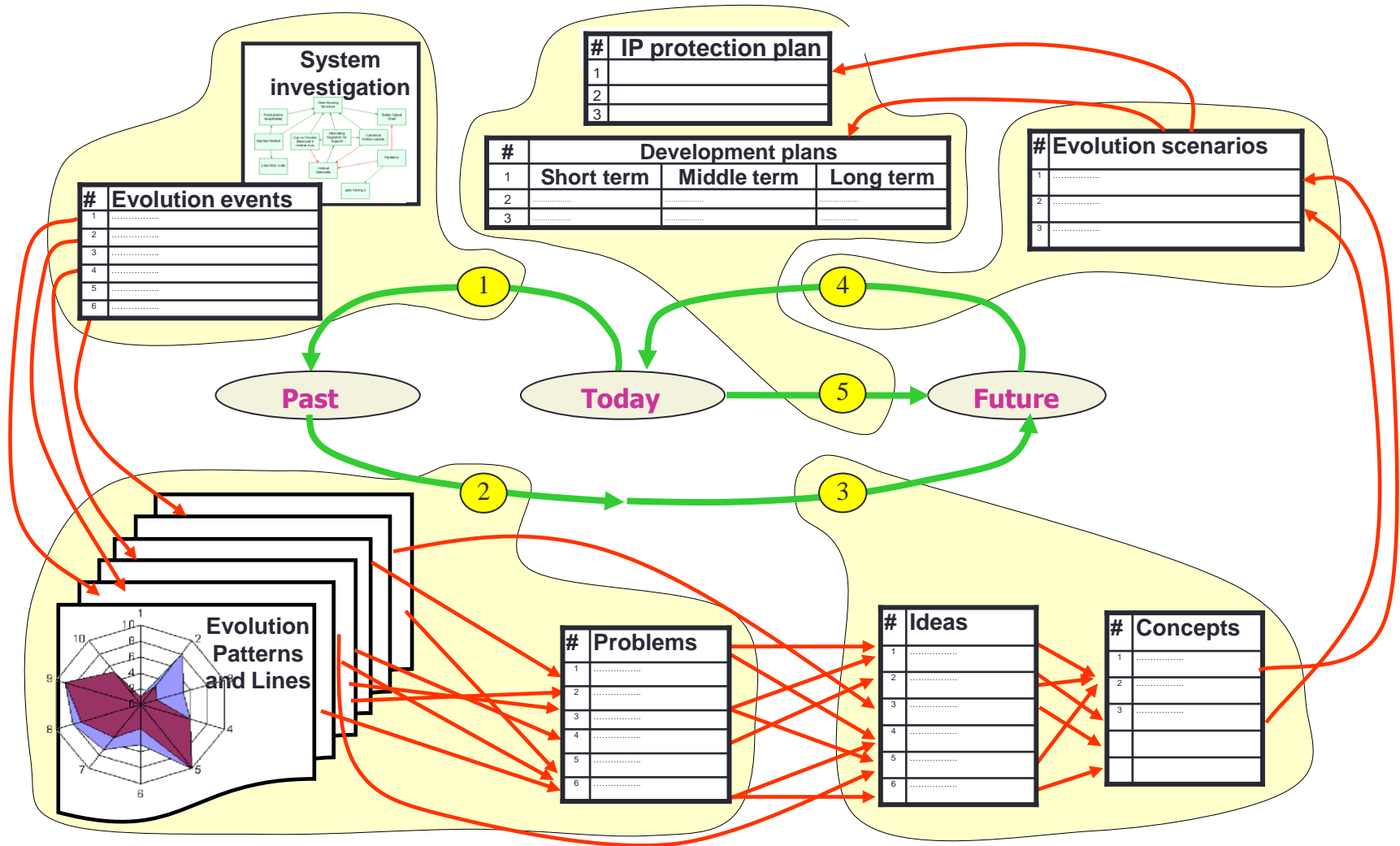
Personal/Personalized

Smart

Customized

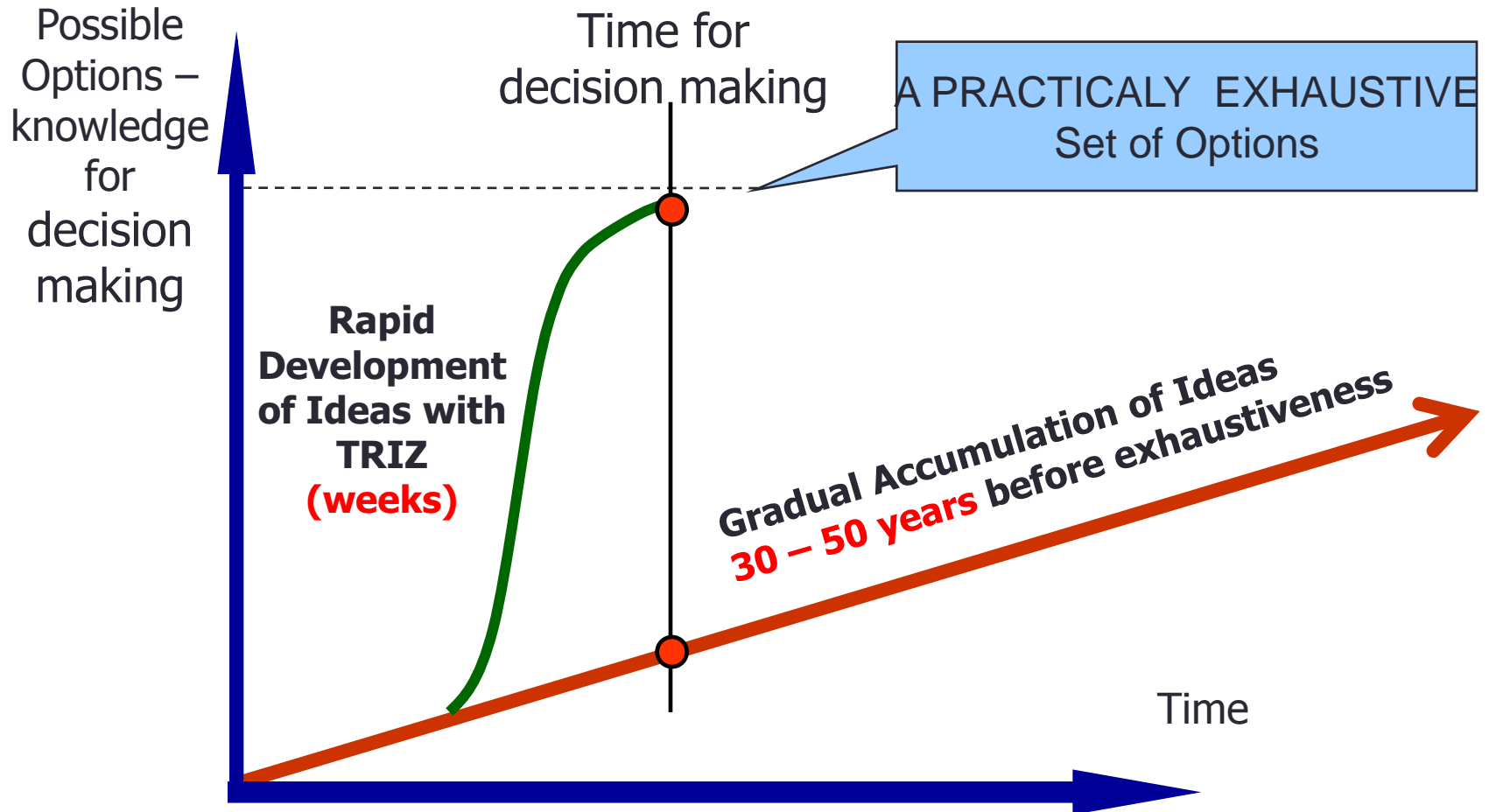**Human Technology/
Human Computer Interfaces**

Directed Evolution Process

2. Application

- We applied this concept to IT company, which produces interactive smart LCD.

- We will show the results in the conference.

3. Conclusion

References

[1] Charles R. Darwin, On the Origin of Species, 1859

[2] Yong Won Song, Sheun Hyun Kang, Gennady Ivanov and Kyung Mo Kim, Technology of creativity, Sunnest, Korea 2014

[3] B. Zlotin and A. Zusman, DE software Program, Ideation Internatioal, Detroit USA

[4] n-gram, http://en.wikipedia.org/wiki/N-gram

[5] APACHE HIVE, http://hive.apache.org/