

Innovation and Abductive Reasoning

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on Linguistics and Language Processing
: 2017/12/17 Session "Sunday Abductive
Reasoning and Creativity in the Context of Ba"

12:30 -13:20, December 17, 2017
8-303/304/305 Waseda University, Tokyo

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1. “Abduction”
2. Error in Christensen’s Argument
3. Role of “Abduction” for Innovation
4. Case Study: Innovation of Blue LEDs
5. General Theory for Innovation
6. Can “Abduction” Be Educated ?

“Abduction” by Pierce

“Abduction” can be characterized as follows:

1. The surprising fact, S , is observed.
2. If a hypothesis, P , were true, the fact, S , would be a matter of course.
3. Hence, there is reason to suspect that the hypothesis, P , is true.

⇒ The inferring process $S \rightarrow P$: “Abduction”

Charles S. Pierce (1965):

Collected Papers of Charles Sanders Peirce, Belknap Press, Vol.5.

Copernicus → Kepler → Newton



Copernicus' heliocentric theory = **Induction**



Kepler's **abduction**:
S= Brahe + Copernicus
P= Kepler's three laws of planetary



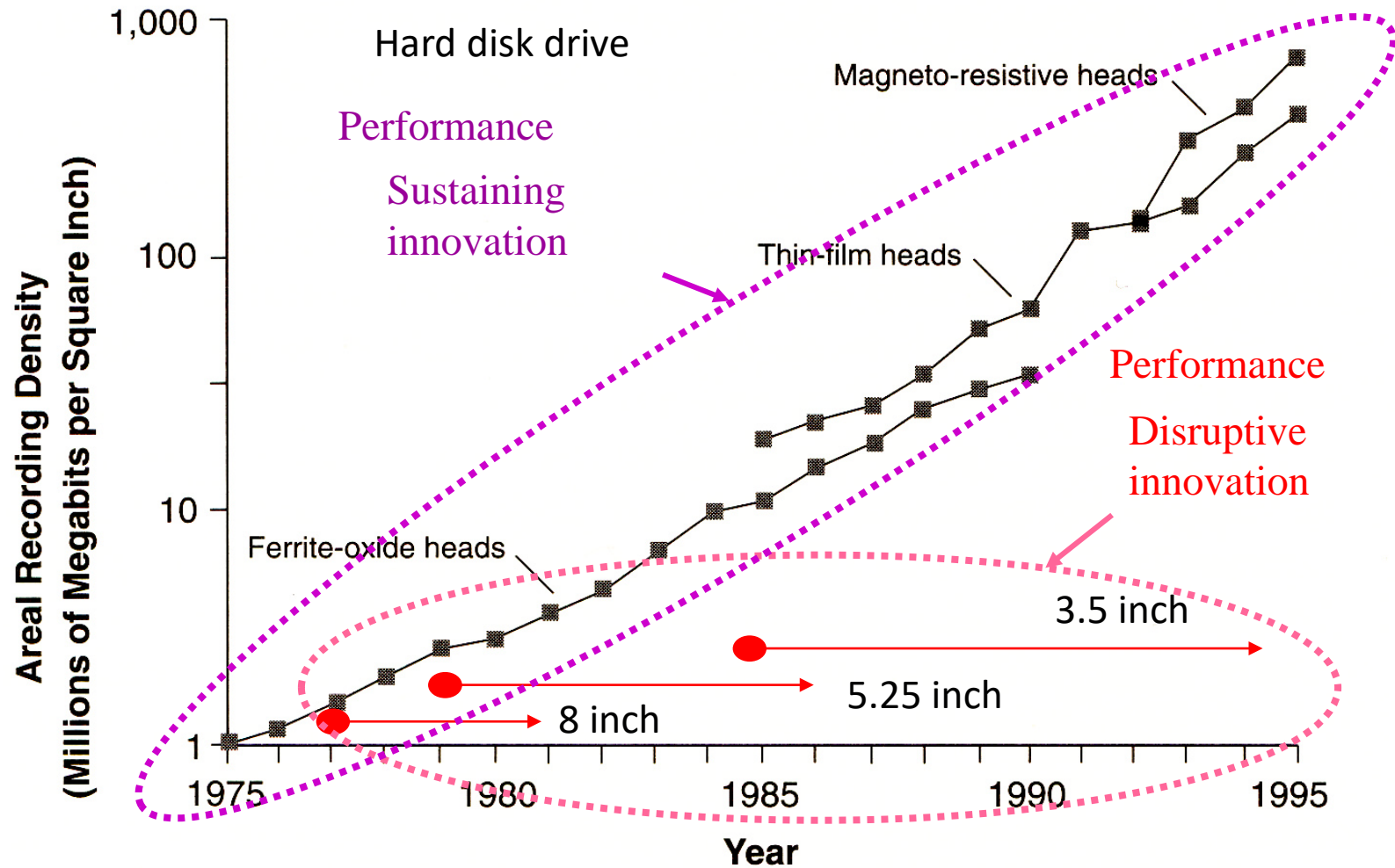
Newton's **abduction**:
S= Kepler's three laws of planetary
P= the law of universal gravitation.
Not only the planets but the whole universe move according to the same law.



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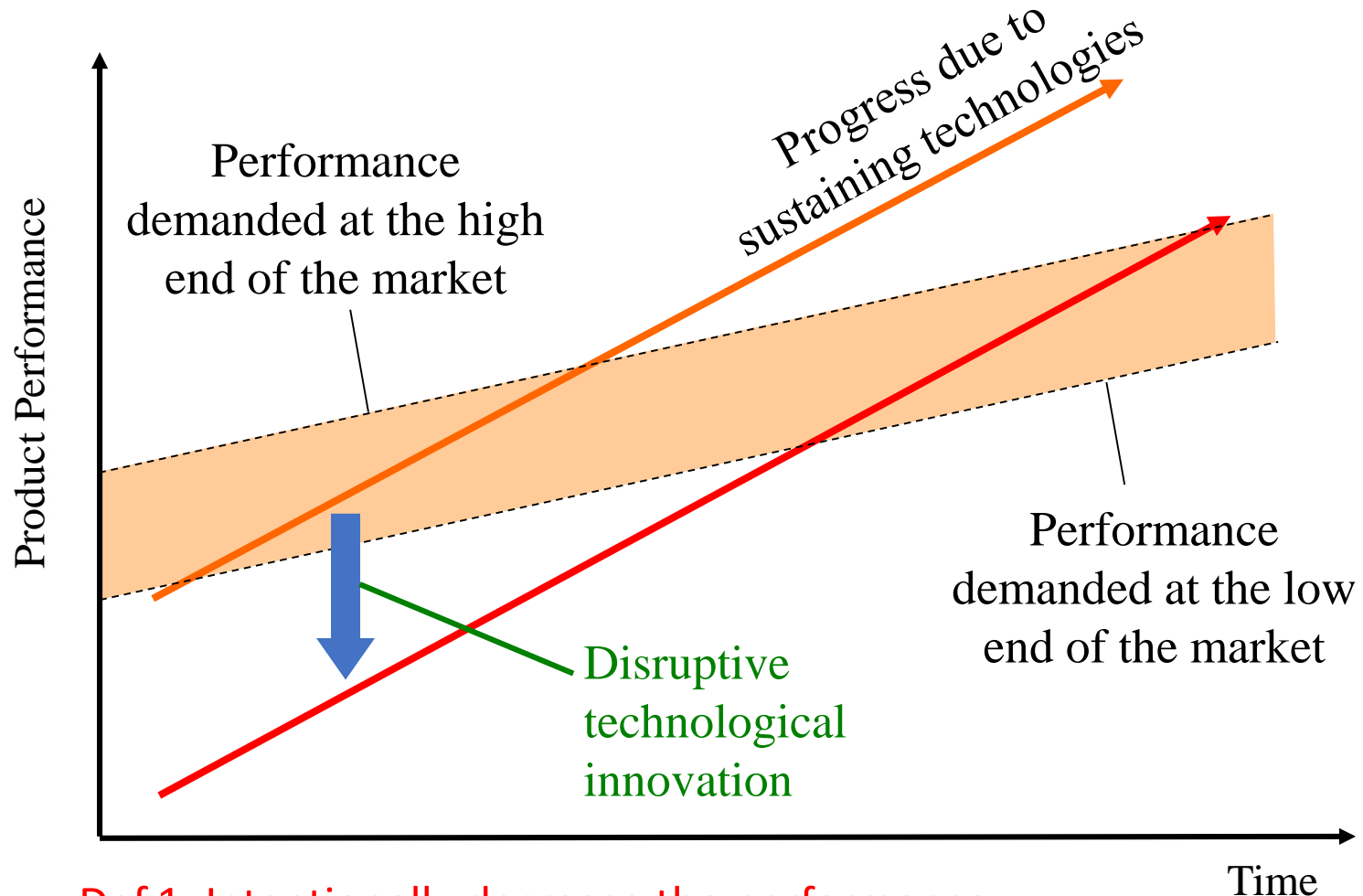
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“Disruptive Innovation” by Christensen



After “Innovator’s dilemma” by Christensen

“Disruptive Innovation” by Christensen



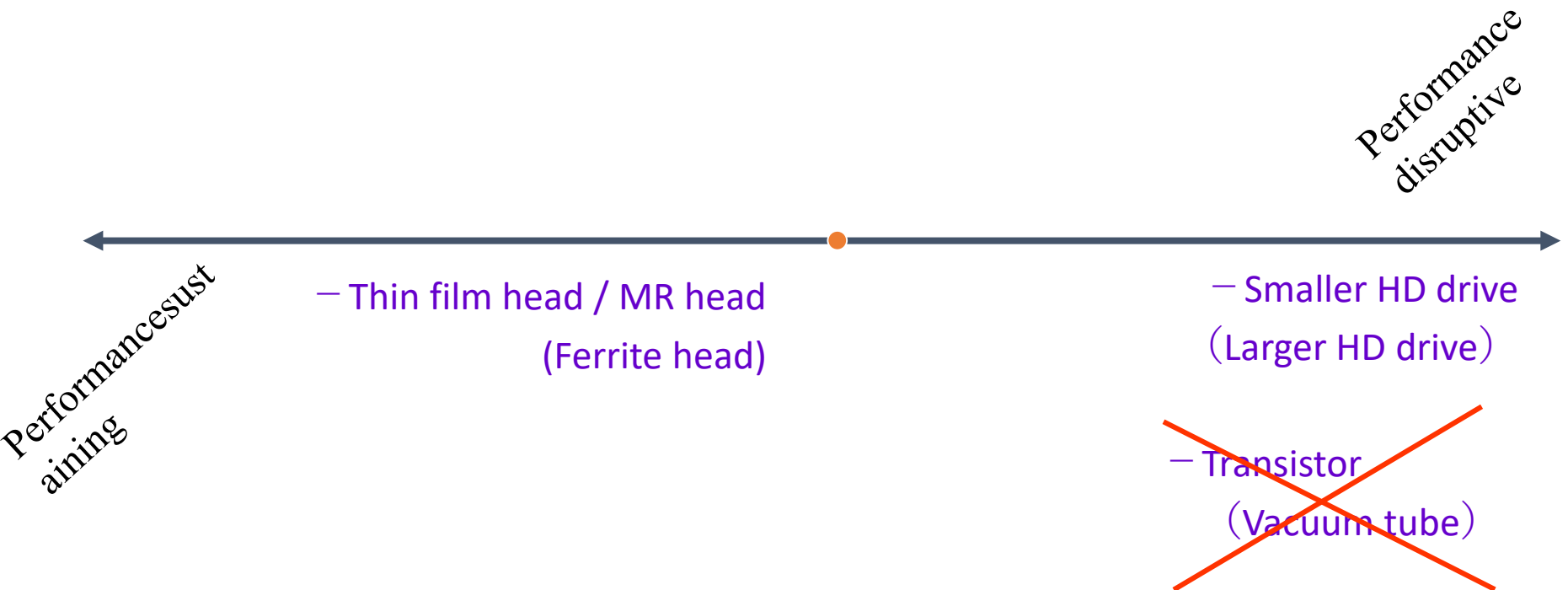
Def.1: Intentionally decrease the performance.

Def.2: Discover new market taking over the main.

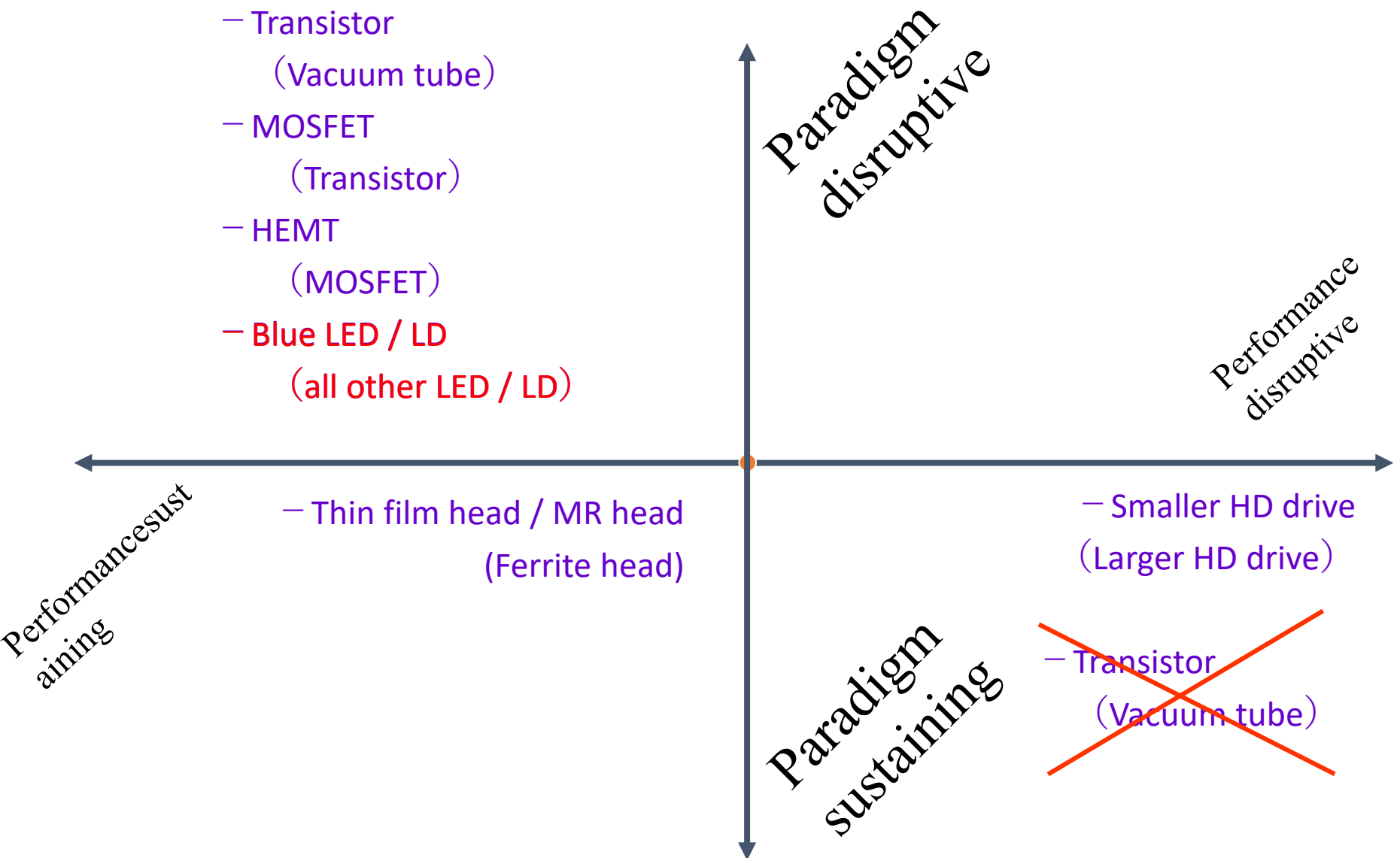
Paradigm Disruptive Innovation

“Transistors were disruptive technologies relative to vacuum tubes. ...”

Introduction, P. xvii, The innovator's dilemma.



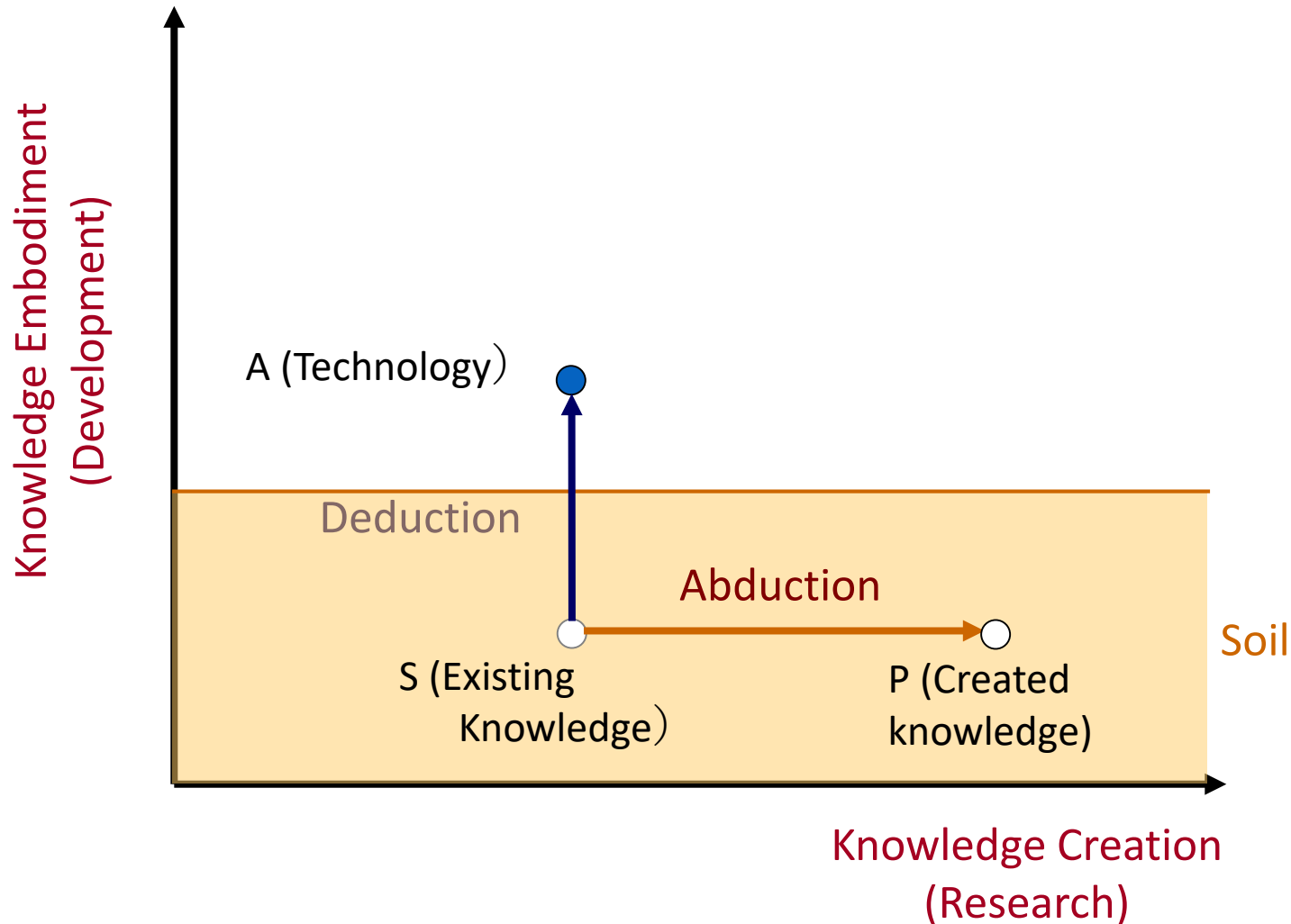
Paradigm Disruptive Innovation



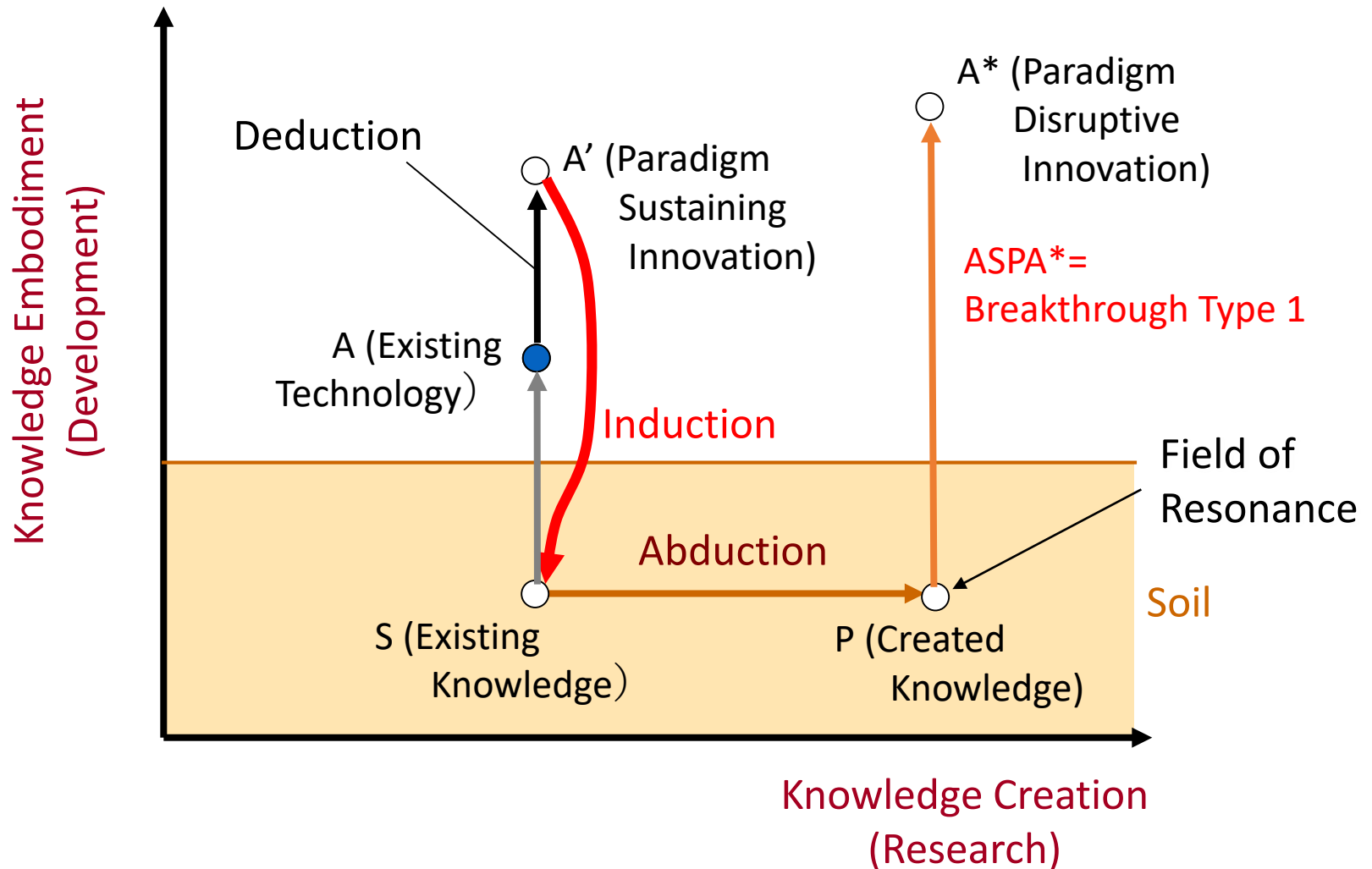
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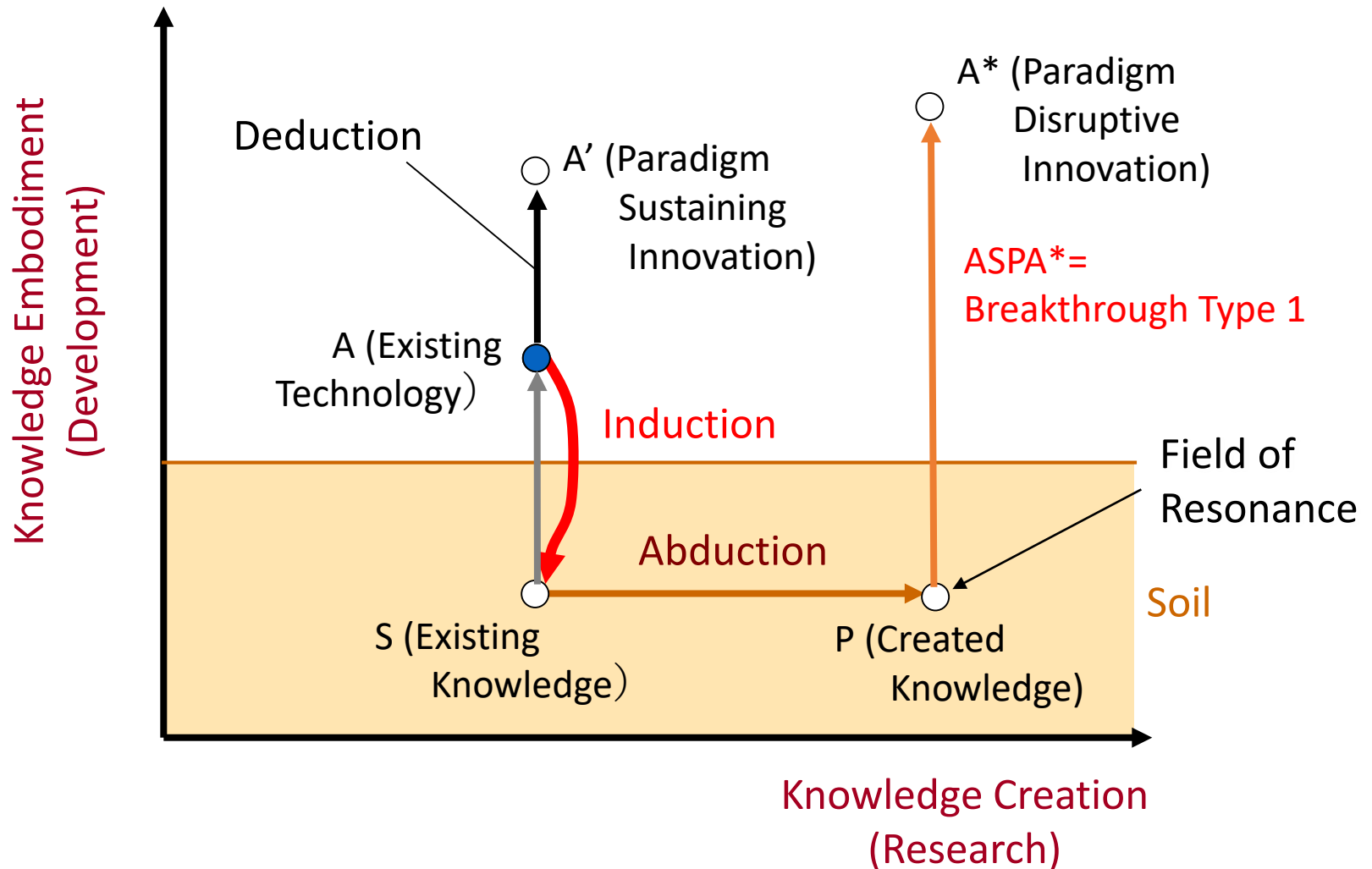
New Concept: Innovation Diagram !!!



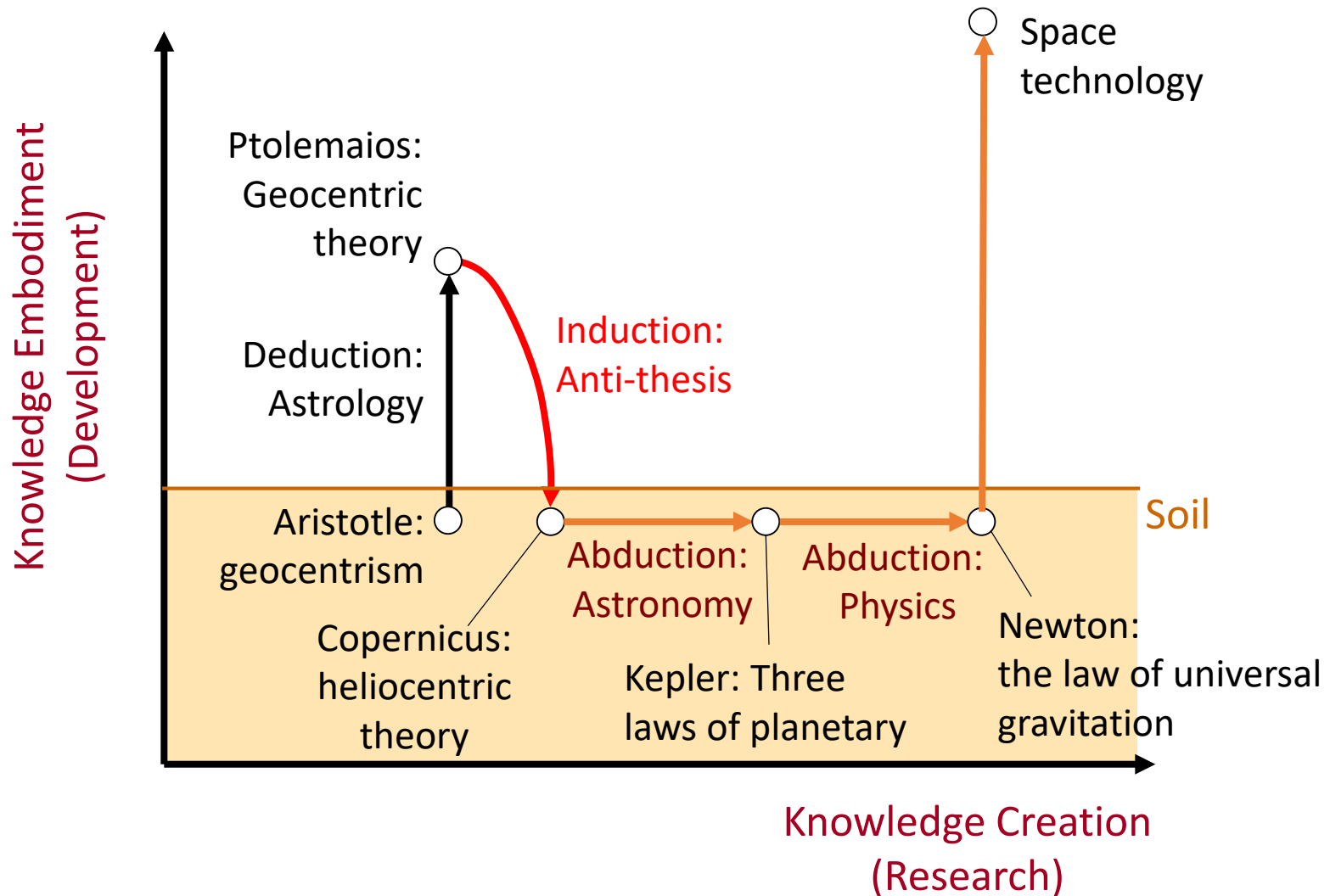
Breakthrough Type 1



Breakthrough Type 1



Copernicus → Kepler → Newton, again

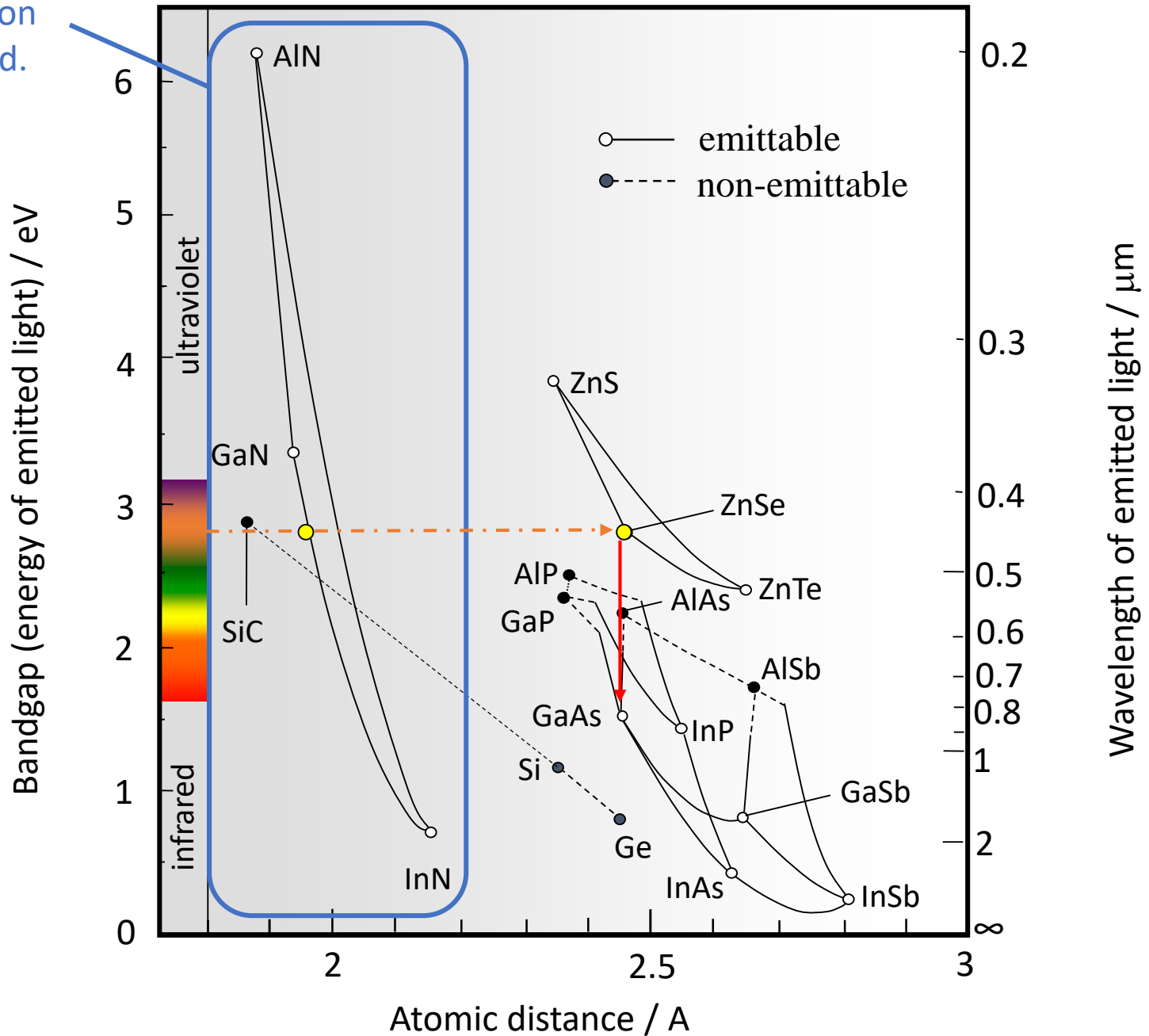


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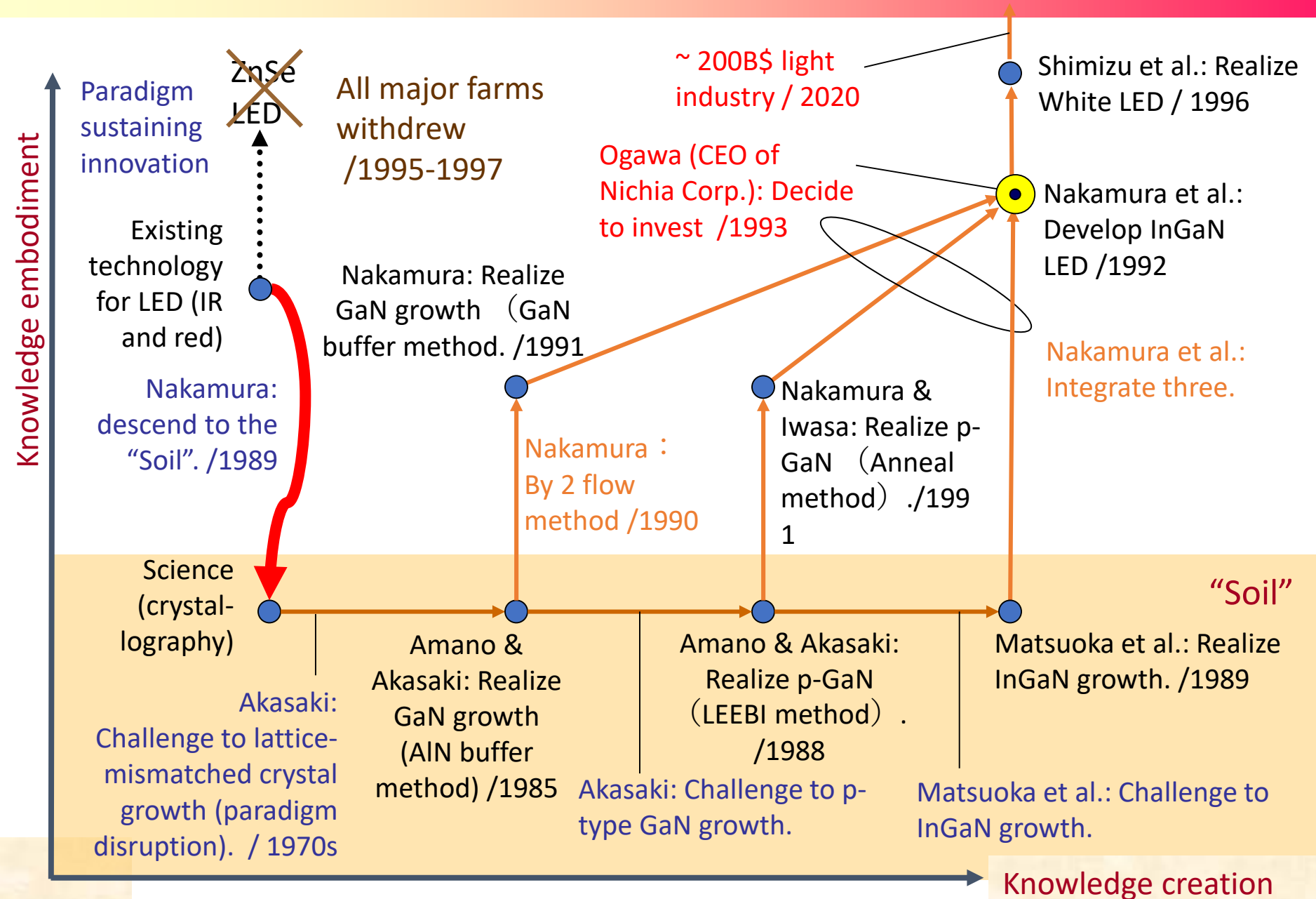
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Bandgap and atomic distance for semicond.

New
generation
semicond.



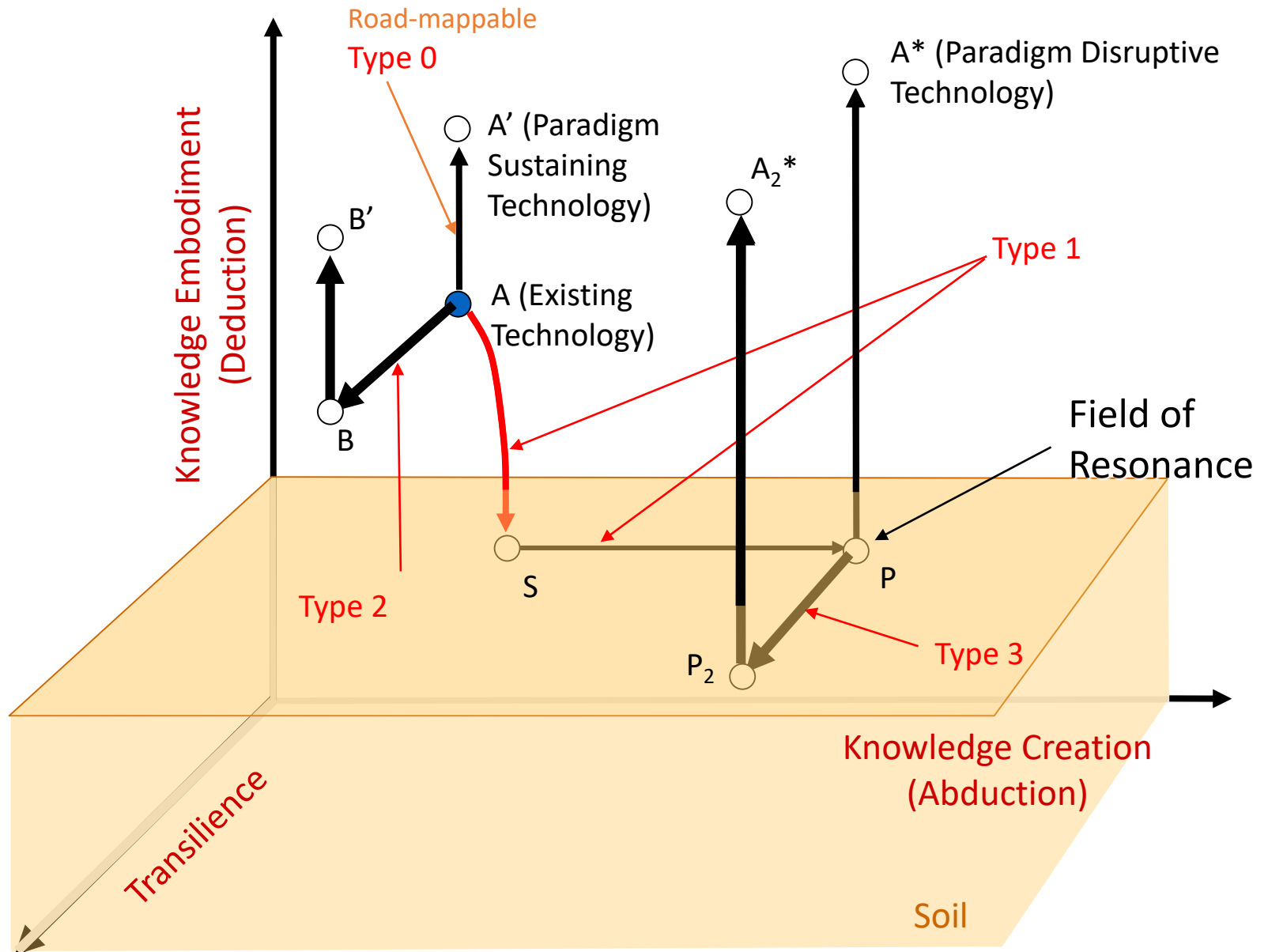
Innovation diagram: Blue LEDs



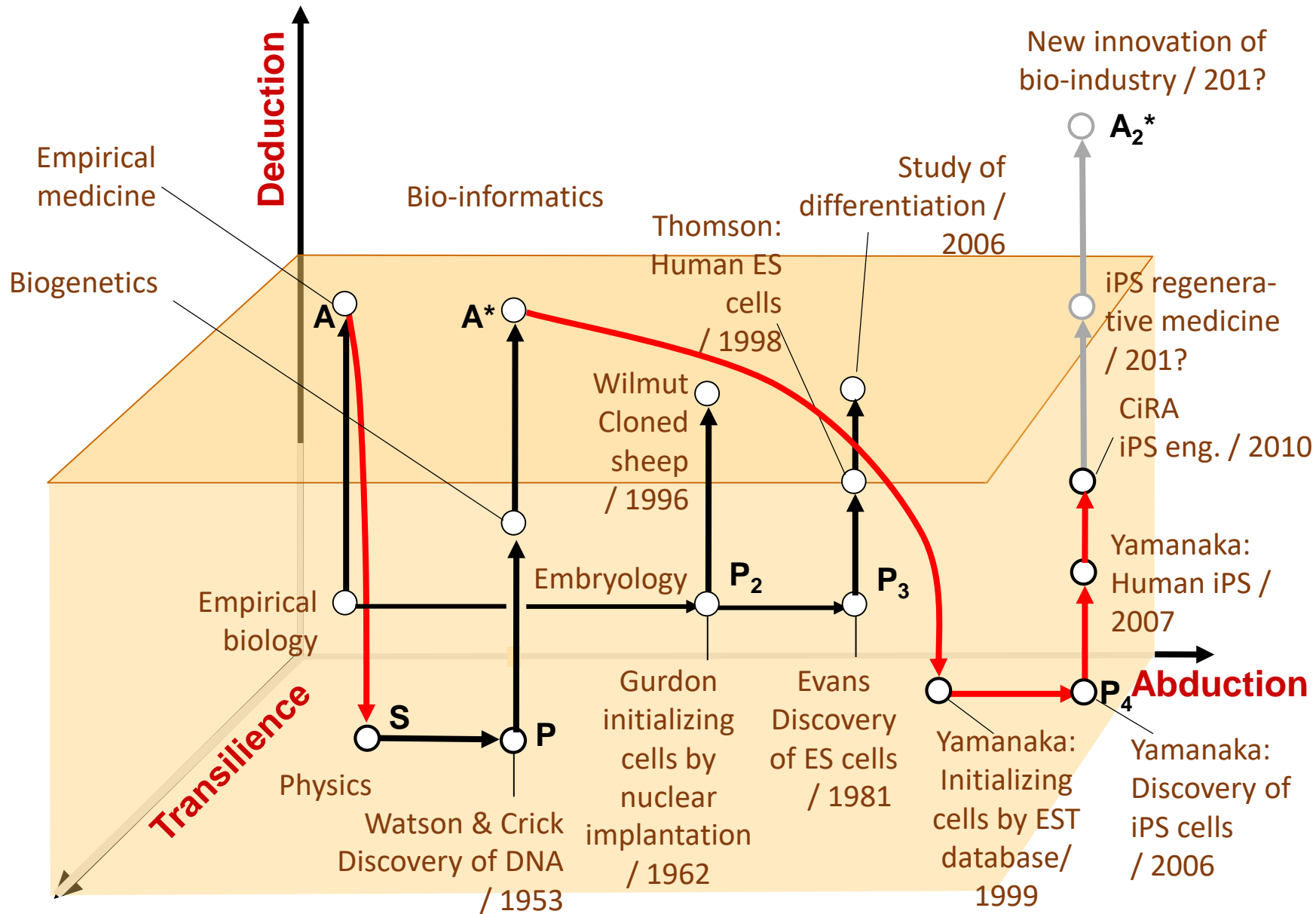
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General Theory for Breakthrough



Innovation Diagram: iPS Cells



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Can abduction be educated ?

1. Abduction results in paradigm disruptive innovation.
2. Abduction is a individual act (not collective) because it is triggered by serendipity.
3. Mindset to seek abduction is equivalent to the desire of existence.
4. Abduction is disturbed by undifferentiated group work of undifferentiated individuals.
5. Abduction is encouraged by “Fields of Resonance” where differentiated individuals can make dialogs to chain inspirations.
6. Abduction is initiated by “discomfort” for existing knowledge/concept. Hence, abduction can happen only after completely learning the existing knowledge/concept, that is, only after making thorough deduction.

Nishihira: “Educational philosophy by Zeami”

Zeami (1363-1443, co-founder of Noh 能) used “resemble”, “not resemble”, and “can resemble”.

“resemble = imitate”. All of beginners try their best to resemble/imitate.

“not resemble”. At a certain point, students can intentionally succeed in resembling the master, and then shift the phase of “not resemble”. For instance, women can behave as women although she does “not resemble”. Namely, “not resemble” is to abandon the intentional act. It is similar to mindlessness.

“can resemble”. While they continue “not resemble” as it is, suddenly “can resemble” happens. It is an unintentional and unexpected phenomenon.

Education toward “resemble” is, in fact, made to reverse toward “not resemble”. At times there, fresh language is born on the horizon without language.

