



Improve Your Thinking: *Substance-Field Analysis*

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How much of your knowledge do
you use in your day-to-day life?

- Usually, a person estimates his or her use of knowledge gained through years of formal study as ranging from 5 to 25%.
- The pattern of use: the more years of formal study a person has, the lower their estimate of use.

*Why do we use so little of our knowledge?
Can we use our knowledge more efficiently?*

Why do we use so little of our knowledge?

- During our life we specialise in the areas of education and work. Because of this, we tend “to live” in the world of our professional interests and heavily rely on the knowledge of our profession.
- Anything outside of this focus is used on very rare occasions, so the unused knowledge is gradually shifted by our brain into some obscure storage location.

How can we use our knowledge more efficiently?

- Be active in many areas. This means we can retain a wider array of knowledge.
- Use techniques which systematically assist in recalling the “lost” knowledge

This role is played by the **Fields** in Substance-Field Analysis

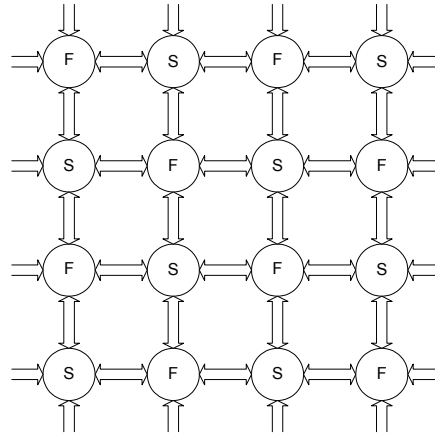
Where Would You Store It?

- Once, Thomas Edison asked a young man who wanted to work for him what he would like to invent the most. "I would like to invent the solvent which dissolves everything", responded the young man. "Good idea", said Edison, "and where are you going to store your miracle?"

Propose Your Ideas:



2D Model of a System



Any (technical) system can be viewed as a set of interacting elements

Substances in Su-Field



Substances in Su-Field can be anything

Mechanical

Acoustic

Thermal

Chemical

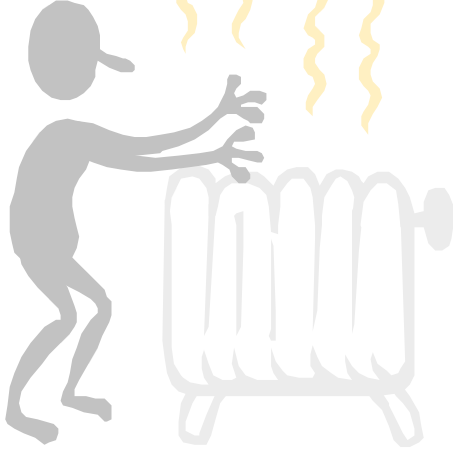
Electric

Magnetic

Intermolecular

Biological

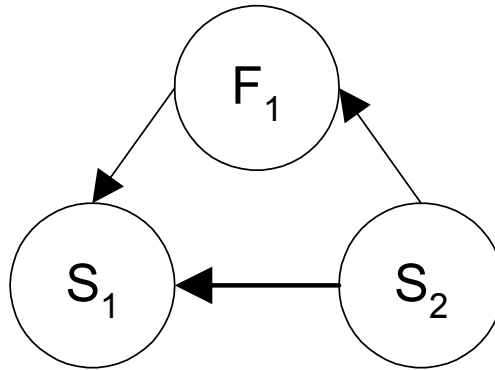
‘Technical Fields’ in Su-Field



Fields in Su-Field are the ‘fields’ we deal with in our day-to-day lives.

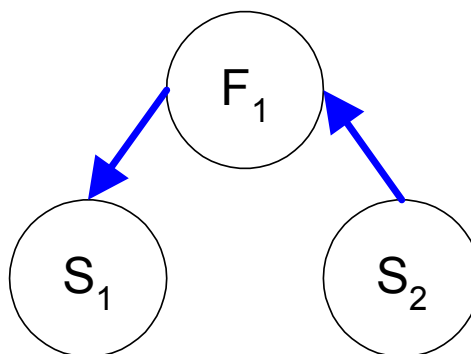
<i>‘Technical Fields’ in Su-Field</i>		
M A T T C E M I B	Fields	Interactions Including
	Mechanical	Gravitation, collisions, friction, direct contact Vibration, resonance, shocks, waves Gas/Fluid dynamics, wind, compression, vacuum Mechanical treatment and processing Deformation, mixing, additives, explosion
	Acoustic	Sound, ultrasound, infrasound, cavitation
	Thermal	Heating, cooling, insulation, thermal expansion Phase/state change, endo- exo-thermic reactions Fire, burning, heat radiation, convection
	Chemical	Reactions, reactants, elements, compounds Catalysts, inhibitors, indicators (pH) Dissolving, crystallisation, polymerisation Odour, taste, change in colour, pH, etc.
	Electric	Electrostatic charges, conductors, insulators Electric field, electric current Superconductivity, electrolysis, piezo-electrics Ionisation, electrical discharge, sparks
	Magnetic	Magnetic field, forces and particles, induction Electromagnetic waves (X-ray, Microwaves, etc.) Optics, vision, colour/translucence change, image
	Intermolecular	Subatomic (nano) particles, capillary, pores Nuclear reactions, radiation, fusion, emission, laser Intermolecular interaction, surface effects, evaporation
	Biological	Microbes, bacteria, living organisms Plants, fungi, cells, enzymes

Su-Field System's Model



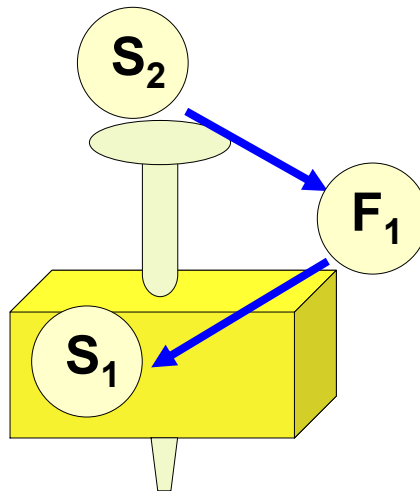
The simplest model of a well-functioning system in Su-Field is represented by a triangle – a **triad**.

Essence of Interaction



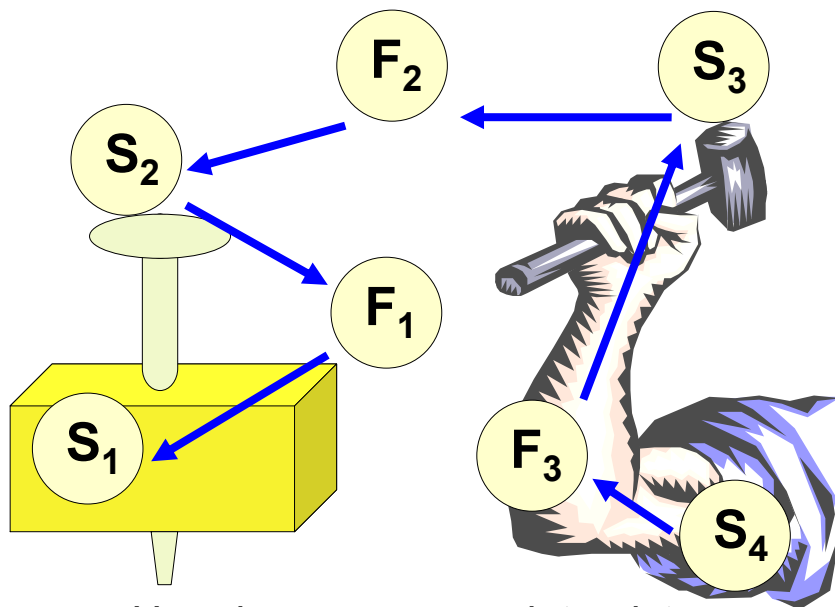
S – F arrows represent the essence of interaction between two substances

Essence of Interaction

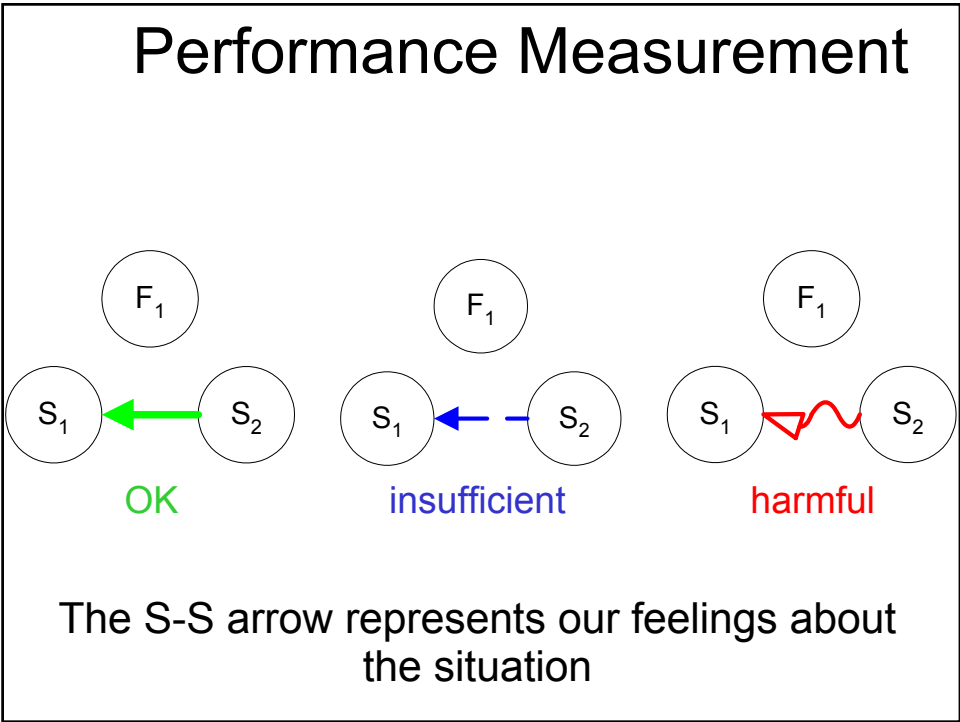
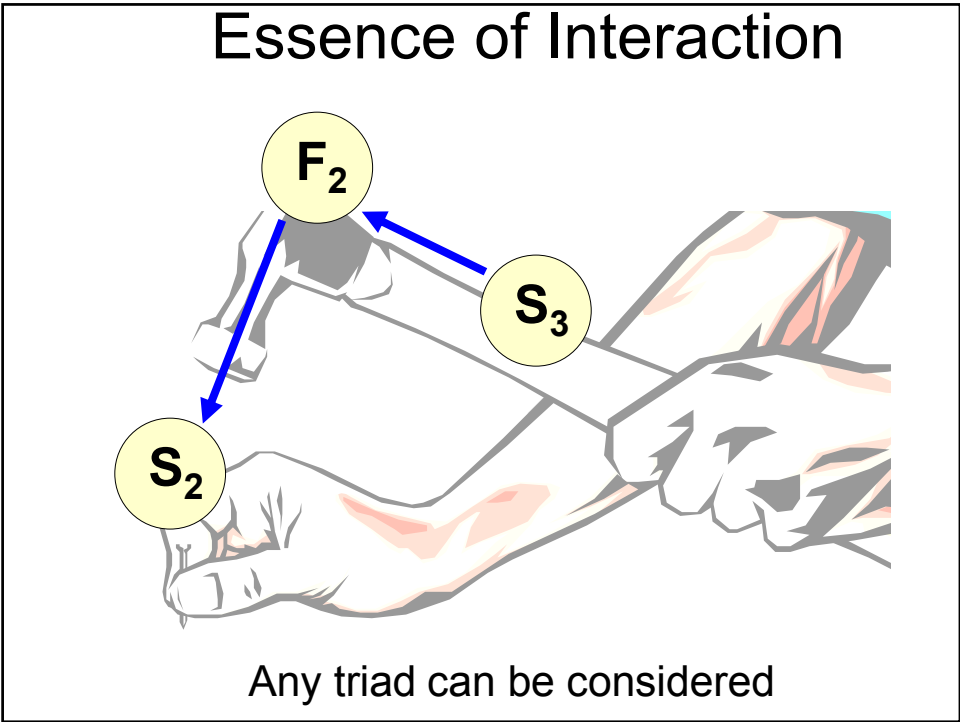


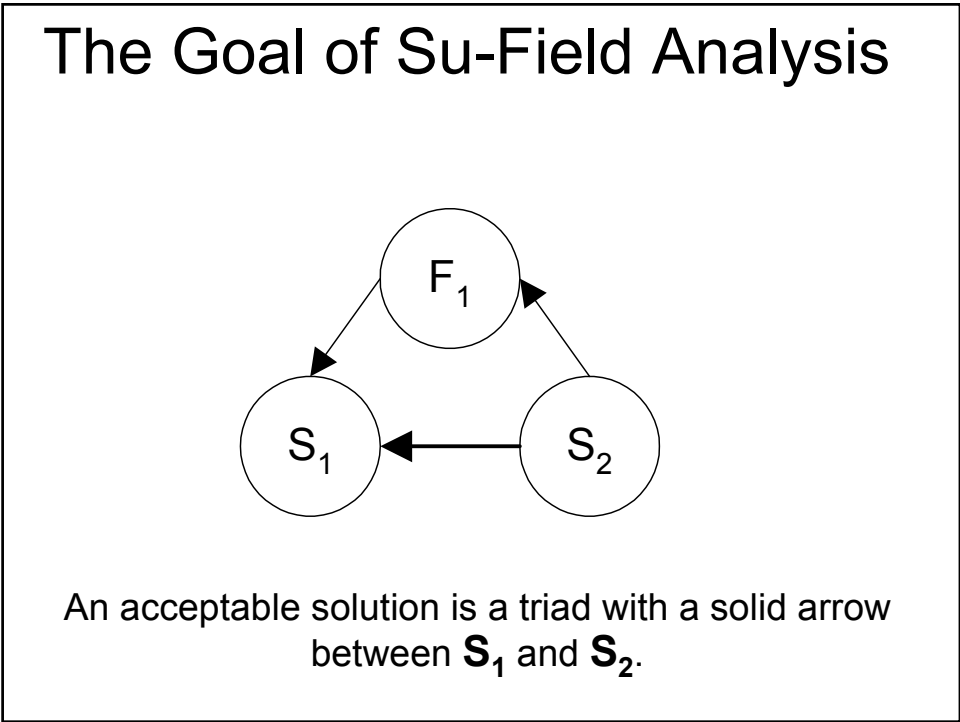
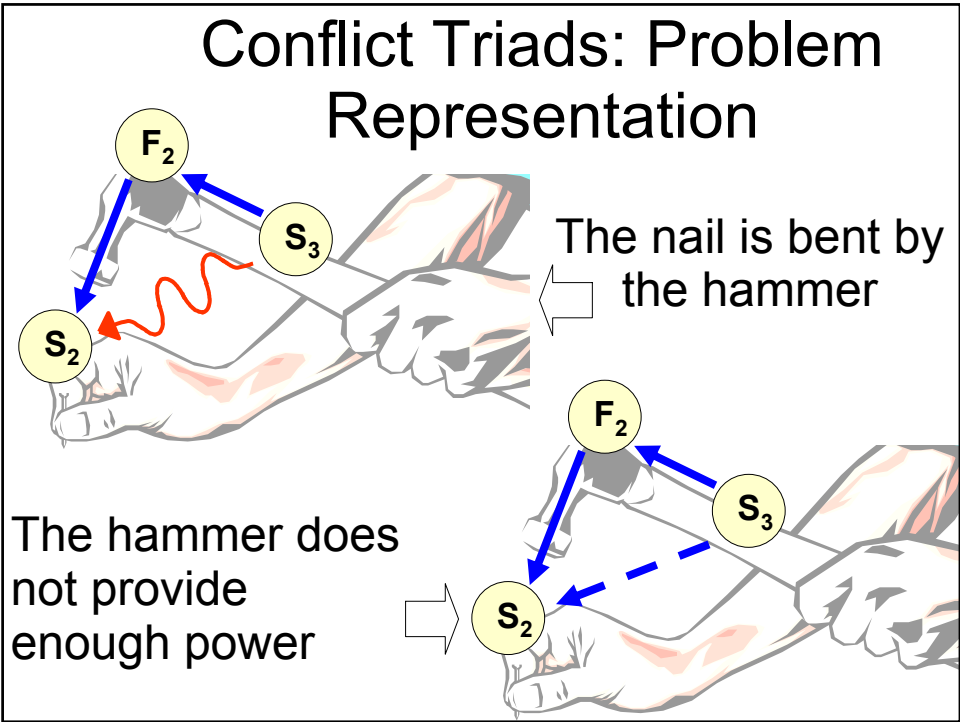
A nail S_2 enters the wood S_1 by means of the pressure F_1 (mechanical field)

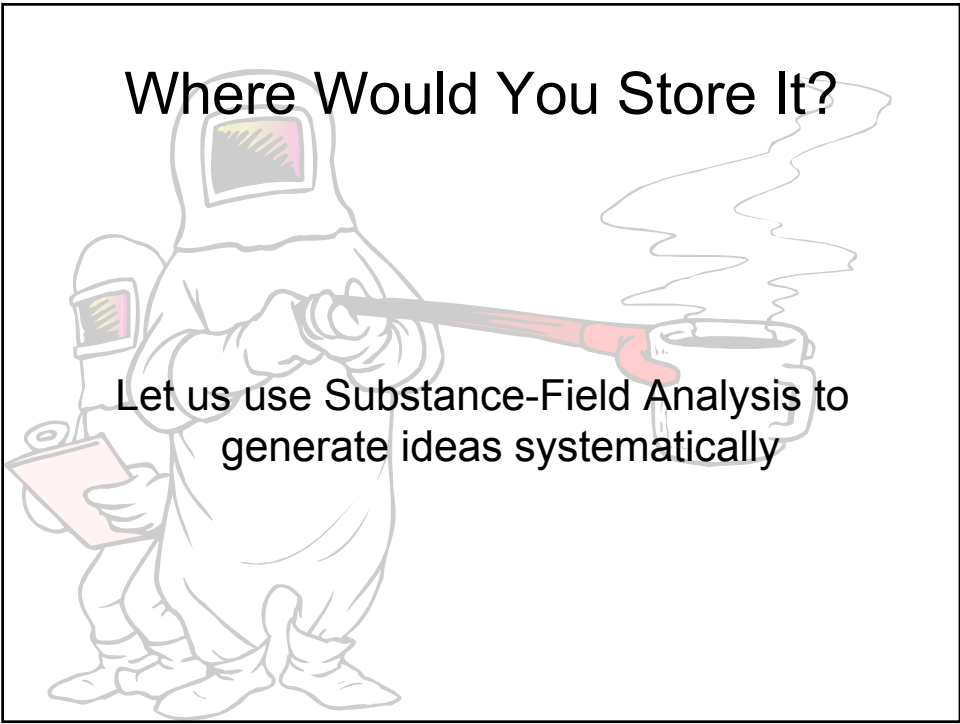
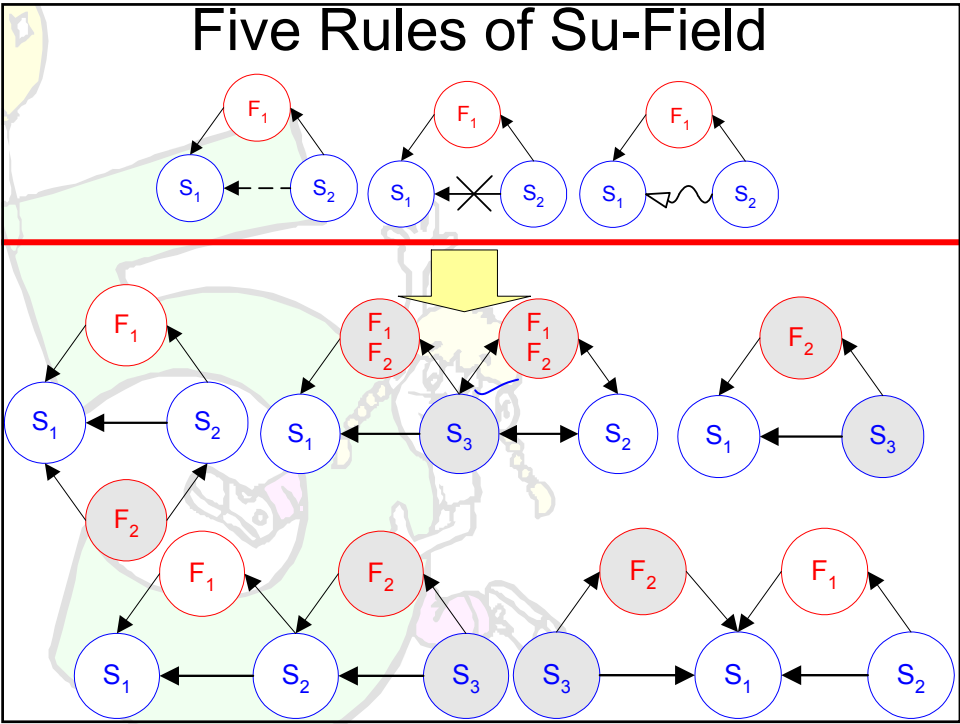
Essence of Interaction



Here is a more complete picture







"Human" Fields			
Field Essence	Field Name	Interaction	Content
Information (Intangible)	Senses	Vision	colour, shape, movement
		Taste	pleasant, bland, unpleasant
		Smell	charming, appetising, neutral, bad
		Hearing	pleasing, dramatic, dull, unpleasant
		Touch	pleasant, electrifying, neutral, painful
		Heat	hot, pleasant, cold
		Pain	high, medium, none
		Balance	normal, abnormal
	Verbal communication	Body Awareness	normal, abnormal
		Route	peripheral, central
		Feature	affective, informational
		Organisation	time, venue, primacy/recency effect, one-or two-sided argument
	Non-verbal communication	Style	humorous, motivating, educational, threatening, commanding
		Visible	facial expression, gesture, posture, appearance
Material Possession (Tangible)	Real Material Possession	Paralinguistic	pitch, loudness, rhythm, inflection, voice quality
		Written	information (true or rumour), request, command, complaint, threat
		Pictorial	picture, sign, puzzle, movie
	Perceived Material Possession	Money	given or taken
		Valuables	given or taken
		Authority	given or taken

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"This book is the most significant study guide on Substance-Field Analysis in the last 20 years."
Mark Barkan, PhD, President MATRIZ

Take control of your knowledge and generate more winning ideas!

This book introduces the reader to contemporary Substance-Field Analysis—one of the powerful tools of TRIZ (Theory of Inventive Problem Solving). Using this book you will learn:

- To model a real situation with substances and fields and to identify the conflicts which lead to the problem at hand
- To accurately use 5 model solutions to resolve every conflict identified
- To employ the 8 fields of MATCEMB to generate ideas
- To fully utilise the resources of your knowledge in generating ideas
- To consider all the ideas generated together and to synthesise them into solution concepts
- To employ Substance-Field Analysis for situations with humans
- To apply Substance-Field Analysis to the area of your expertise

ABOUT THE AUTHOR
Iouri Belski, PhD, has practised TRIZ since 1992. In 2000, the Australian Government awarded him the Citation For Outstanding Contribution To Student Learning. For the creation of innovative methodologies and imaginative resources which help students in enhancing thinking and problem-solving skills.

"This work provides an introduction to creative thinking, problem solving and invention on a new scale and will benefit anyone charged with the task of breaking new grounds in systems thinking that requires concrete and tangible advances."
Max Dumais, founding CEO of the de Bono Institute

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The book that enables you to use your knowledge more effectively

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