Game Design

Lecture 1

Ground Rules

Tasks can be submitted after deadline, but with penalty (20%/week)

If there is a reason for delay – keep teacher informed

If you don’t understand the task or don’t know what to do – keep teacher informed

Build a team (or get a random team)

Zero tolerance for cheating

Lectures Findings

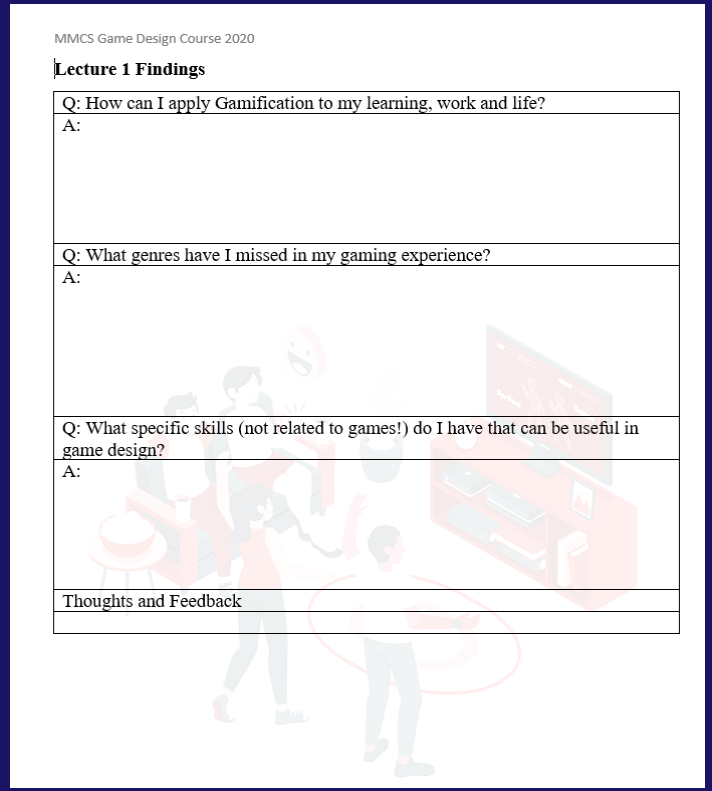
There are no points for lectures!

For each lecture you will get a Findings Sheet

You must submit your Findings and Feedback
until the end of the lecture + 5 mins

You can submit Sheets with some findings missing

At the end of the course 3 top Finders will be awarded



MMCS Game Design Course 2020

Lecture 1 Findings

Q: How can I apply Gamification to my learning, work and life?
A:
Q: What genres have I missed in my gaming experience?
A:
Q: What specific skills (not related to games!) do I have that can be useful in game design?
A:
Thoughts and Feedback

TABLE OF CONTENTS

01

Game

“Game is an activity of play in the pretended reality where participants try to achieve challenging goal by acting in accordance with rules.”

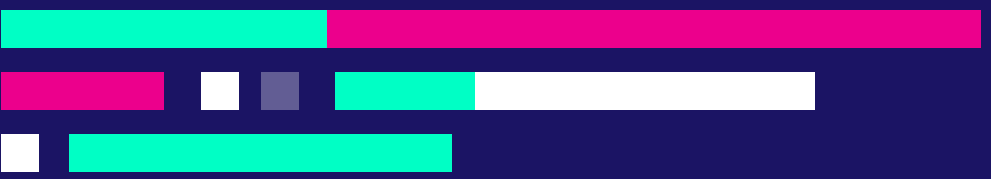
—Ernest Adams (2009) Fundamentals of game design

Who Studied Games?

- Irving Finkel - International Board Game Studies Association, 1990
- Gonzalo Frasca – Ludology, 1999, “Game Studies”, 2001
- Actually, Mihaly Csikszentmihalyi, Ludology 1982
- Amy Jo Kim and Jane McGonigal, Gamification
- Vladimir Propp, Narratology,1928

Serious Games

Not only for entertainment



- Education
- Defense
- Healthcare
- Economics
- ????

Game-based Approach

Gamification

Using game design elements or creating game like emotions in non-game context

Gamefulness

Experiential and behavioral qualities of gaming

Playfication

The use of play elements in non-playful context

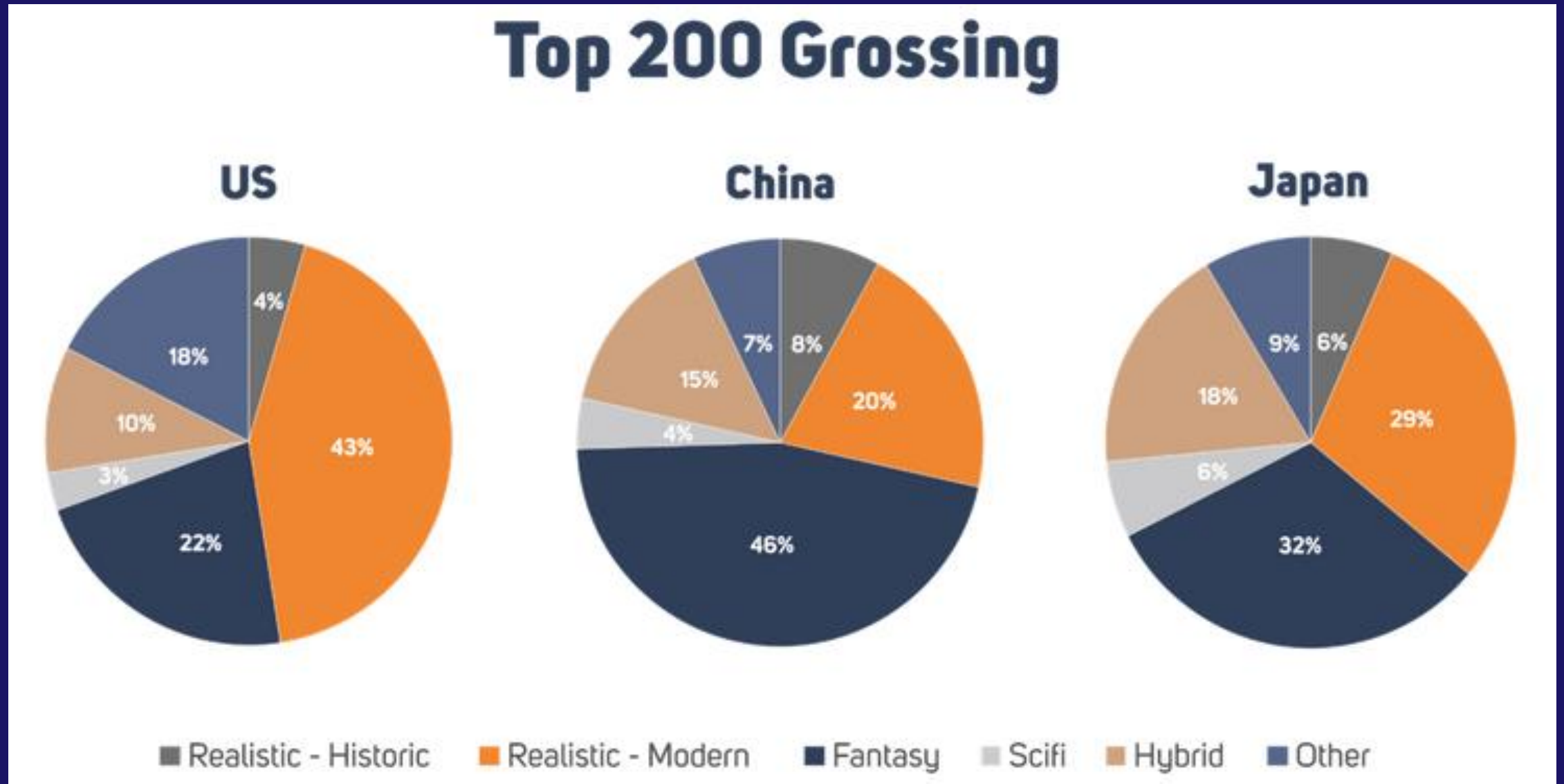
Game Elements

Genre

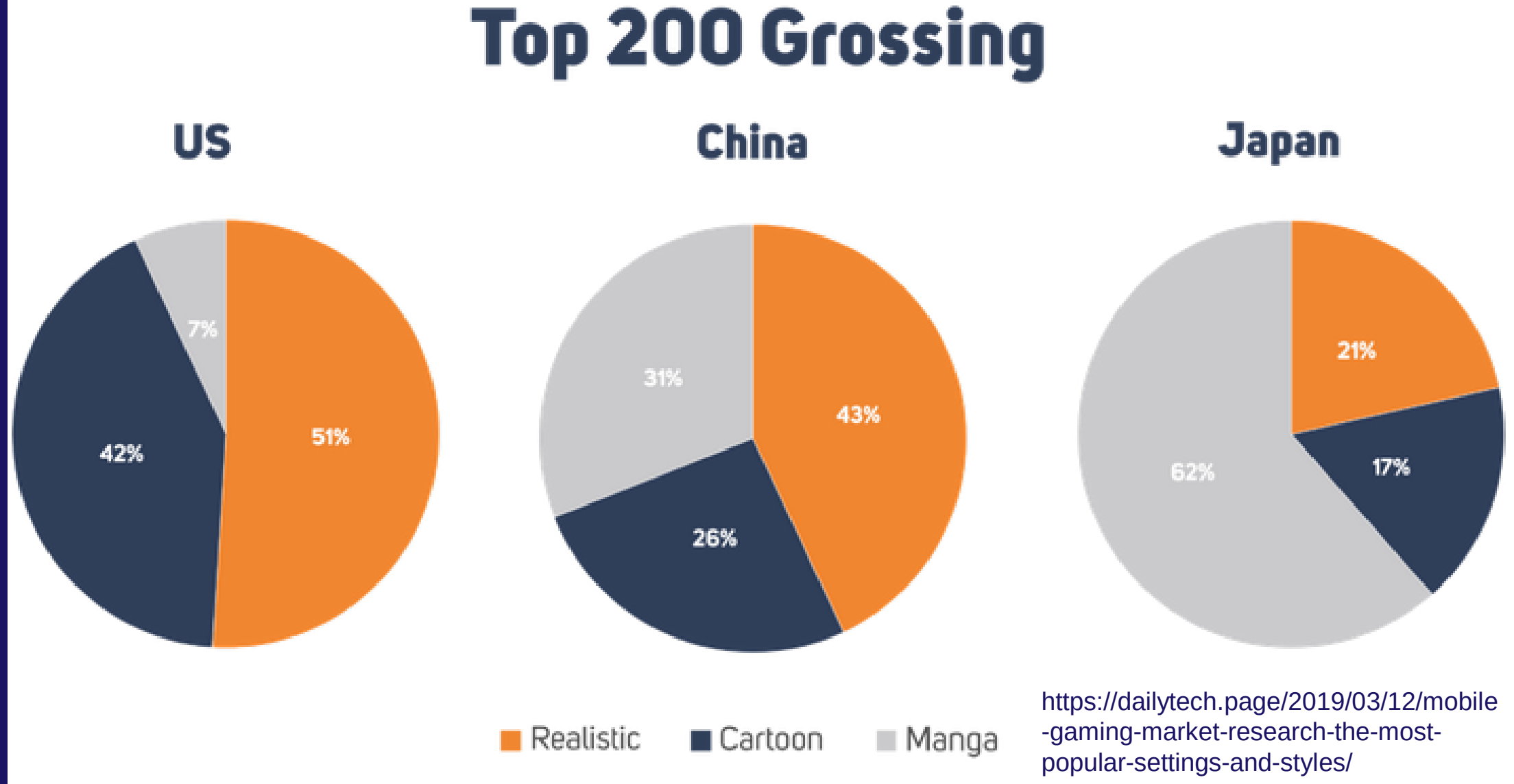
Tom Hirschfeld, 1981, “How to Master the Video Games”:
Space Invaders-type, Asteroids-type, maze, reflex, and miscellaneous

Genre	Softalk	VGC top 100							ESA
	1980-1984	1995	2000	2005	2010	2015	2016	2017	2018	
Action	61	3	4	12	15	27	25	22	29	22.5
Adventure	11	2	4	7	6	2	1	0	1	7.8
Fighting		15	10	5	2	5	3	5	5	5.8
Misc		4	7	7	12	7	8	9	8	4.1
Platform		10	7	10	9	4	3	4	9	
Puzzle		9	2	6	1	0	0	1	1	
Racing		6	6	13	8	5	4	6	6	3.3
Role-playing	18	18	25	7	16	12	15	17	12	12.9
Shooter		11	1	8	14	22	24	19	13	27.5
Simulation		6	7	5	0	4	4	0	2	
Sports		9	19	17	16	12	13	15	13	11.7
Strategy	10	7	8	3	1	0	0	2	1	4.3

Setting


Top 200 Grossing
US
4%
43%
22%
3%
10%
18%
China
8%
20%
46%
4%
15%
7%
Japan
6%
29%
32%
6%
18%
9%
Realistic - Historic
Realistic - Modern
Fantasy
Scifi
Hybrid
Other

Aesthetics and Visual Style



https://dailytech.page/2019/03/12/mobile-gaming-market-research-the-most-popular-settings-and-styles/

Rules

Operational Rules
Foundational Rules
Behavioral Rules
Written Rules
Laws
Official Rules
Advisory Rules
House Rules

Mechanics

Movement
Jump
Enemies
Blocks
Pipes

02

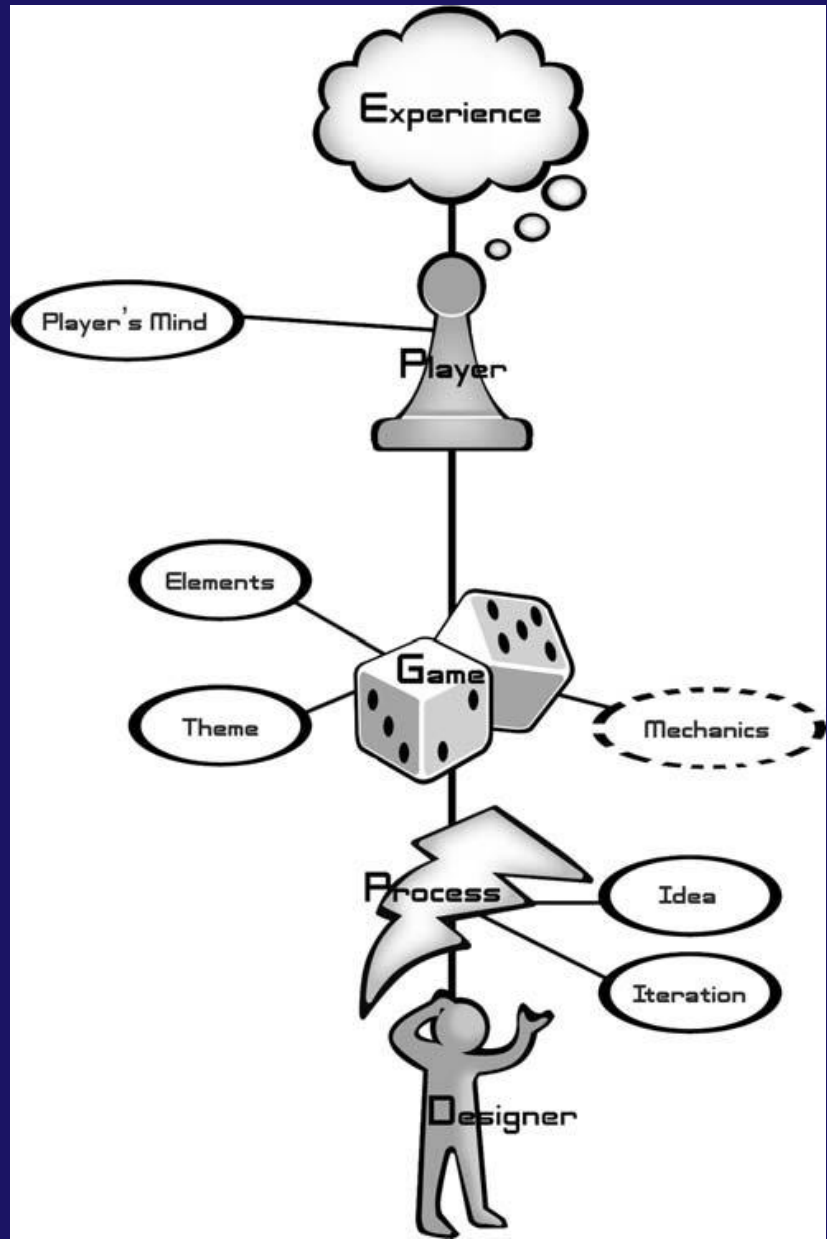
Game Designer

A lot of questions!

What is this game about?
What genre? What setting?
How many players?
What rules?
Does it need red barrels?
What platform should we target?
Do we need VR?
Do we need high FPS?

Game Designer

Asks the questions
Answers the questions
How?
Produces ideas
Tests hypothesizes
Describes tasks for other team members
Writes story
Builds levels
…



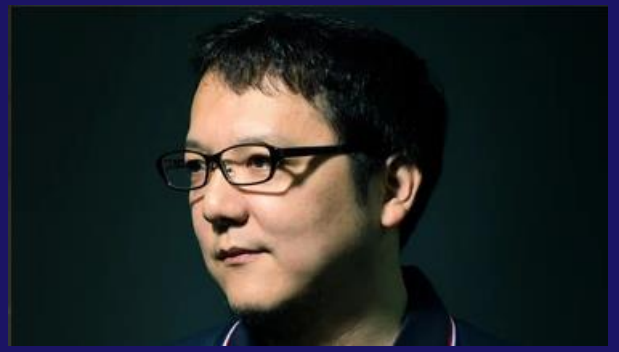
Types of Game Designers

System Designers
Technical Designers
UI Designers / Usability Experts
Game Writers
Content Designers
Level Designers

Origins

Writer

Cash Register Developer



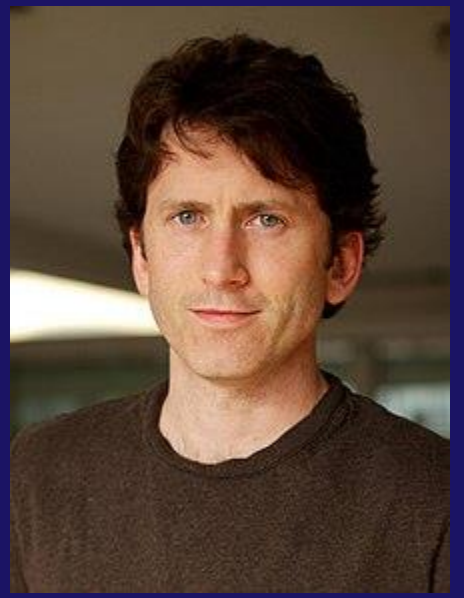
Account Manager

Salesman

Game Designer

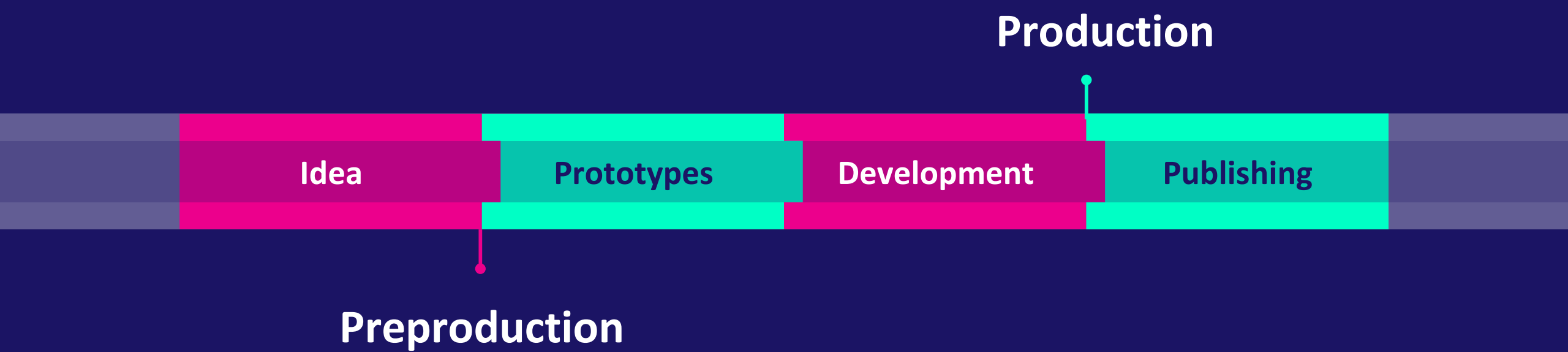
Artist

Developer!



Producer

Game Building Timeline



Detailed Plan

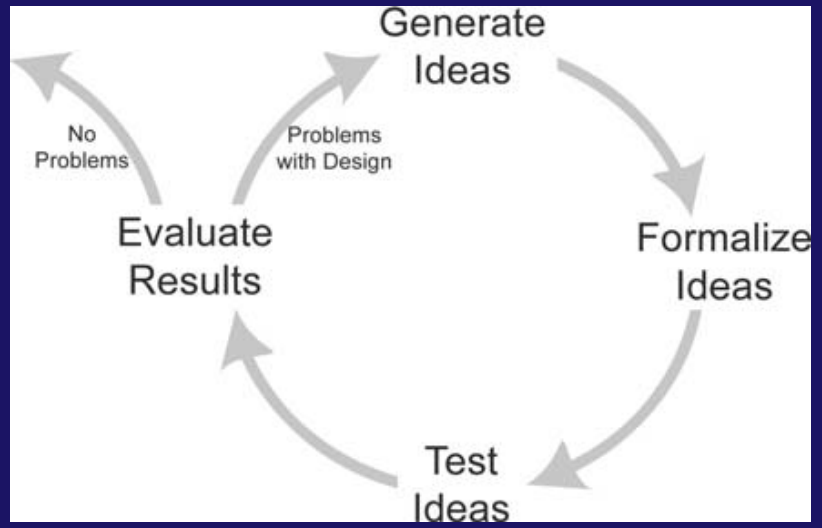
Player experience goals are set.

An idea or system is conceived.

An idea or system is formalized (i.e., written down or prototyped).

An idea or system is tested against player experience goals (i.e., play-tested or exhibited for feedback).

Results are evaluated and prioritized.



Step-by-step

1. Brainstorming
2. Physical Prototype
3. Presentation (Optional)
4. Software Prototype(s)
5. Design Documentation
6. Production

03

Ideation

Ideas Factory

Preparation: Preparation is becoming immersed in a topic or domain of interest, a set of problematic issues.

Incubation: Incubation is a period of time in which ideas “churn around” below the threshold of consciousness

Insight: Insight is sometimes called the “aha!” moment, when the pieces of puzzle, or an idea, fall together.

Evaluation: Evaluation is when the person decides whether the insight is valuable and worth pursuing. Is the idea really original?

Elaboration: Elaboration is the longest part of the creative process; it takes the most time and is the hardest.

Ideation Challenge

100 Ideas through the course

Types of innovation

- Derivative idea: e.g. Diet coke
- Symbiotic idea: smartphone camera
- (R)evolutionary idea: the World Wide Web
- Serendipitous discovery: e.g. penicilin
- Computer-assisted discovery:

Ideation Techniques

Mass idea generation techniques (Brainstorms, 635)

Fantastic binomial

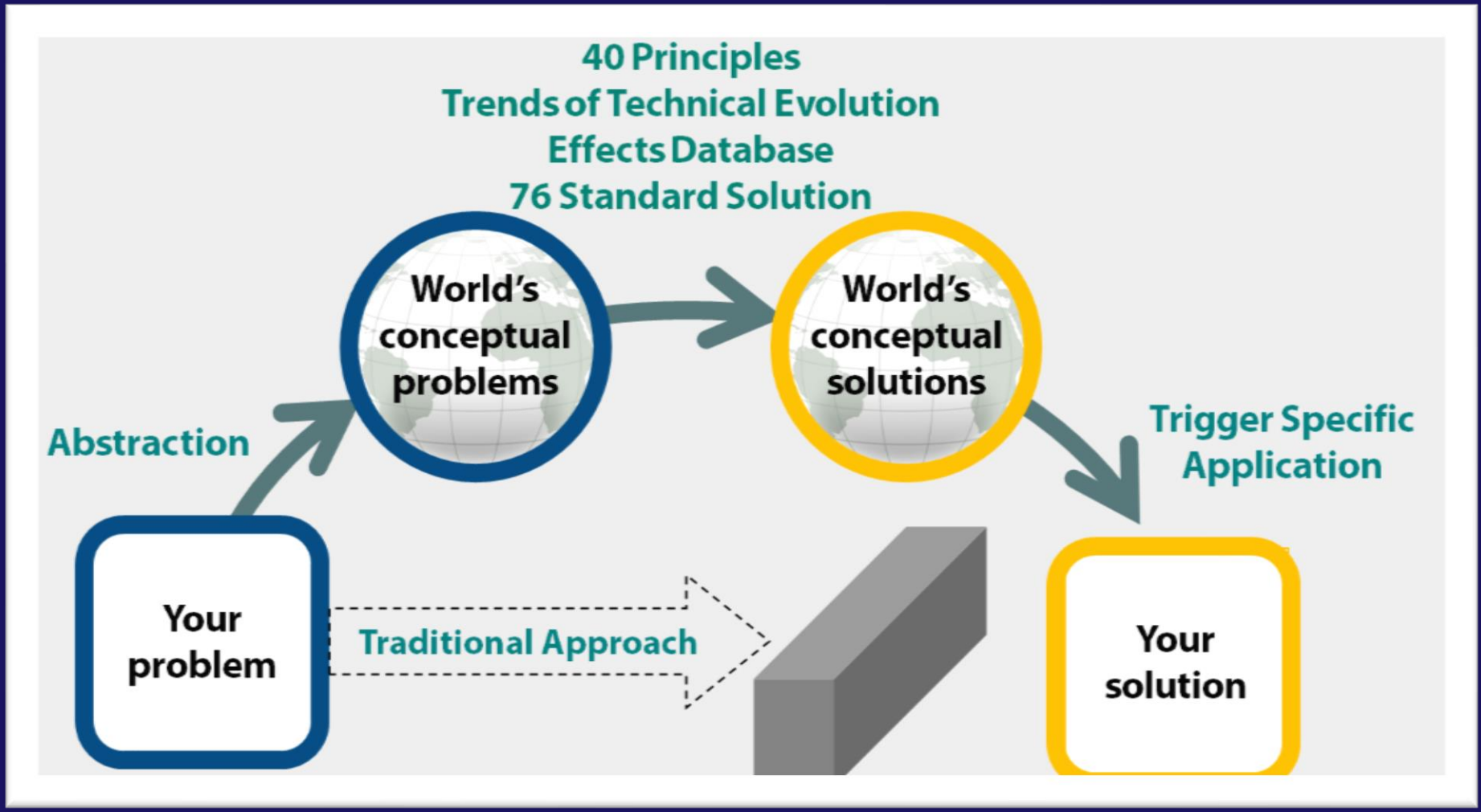
Problem Solving

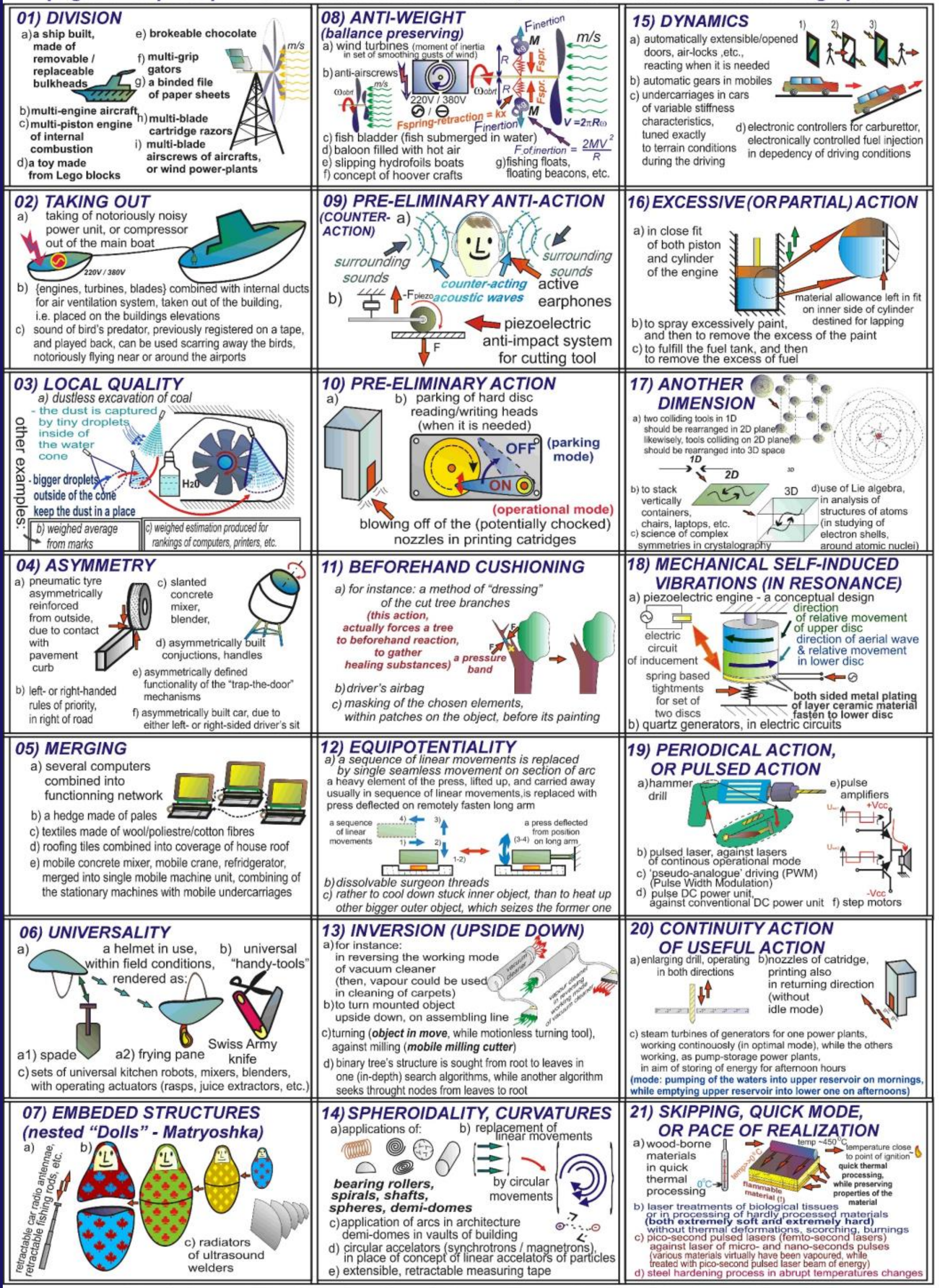
SCAMPER

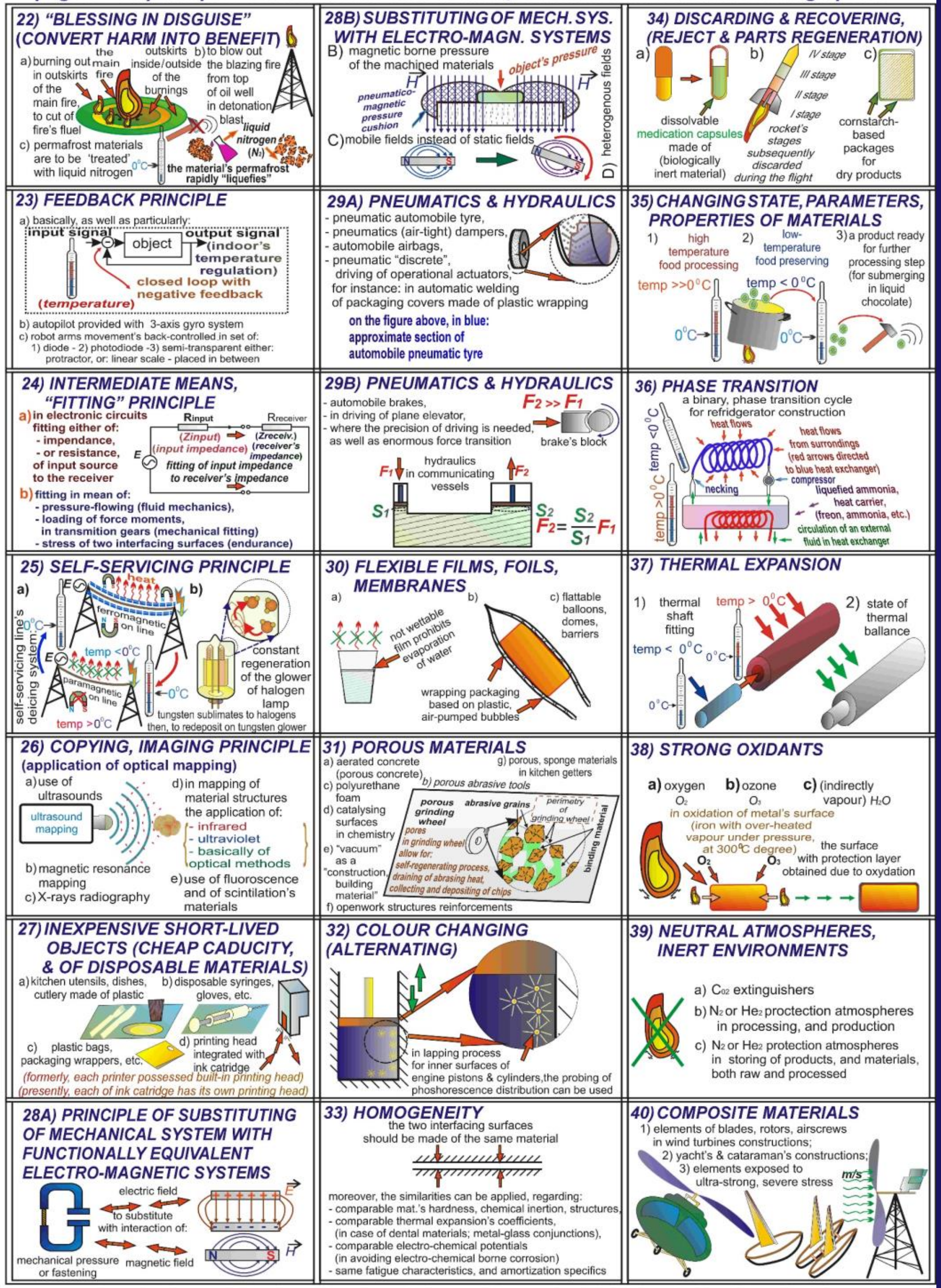
S = Substitute
C = Compare
A = Adapt
M = Magnify
P = Put to another use
E = Eliminate (or minimize)
R = Reverse

TRIZ

Theory of the resolution of invention-related tasks




01) DIVISION
a) a ship built, made of removable / replaceable bulkheads
b) multi-engine aircraft
c) multi-piston engine of internal combustion
d) a toy made from Lego blocks
e) brokeable chocolate
f) multi-grip gators
g) a binded file of paper sheets
h) multi-blade cartridge razors
i) multi-blade airscrews of aircrafts, or wind power-plants
08) ANTI-WEIGHT (ballance preserving)
a) wind turbines (moment of inertia in set of smoothing gusts of wind)
b) anti-airscrews
220V / 380V
Fspring-retraction = kx
Finertion
V = 2πRω
c) fish bladder (fish submerged in water)
d) baloon filled with hot air
e) slipping hydrofoils boats
f) concept of hoover crafts
g) fishing floats, floating beacons, etc.
15) DYNAMICS
a) automatically extensible/opened doors, air-locks, etc., reacting when it is needed
b) automatic gears in mobiles
c) undercarriages in cars of variable stiffness characteristics, tuned exactly to terrain conditions during the driving
d) electronic controllers for carburettor, electronically controlled fuel injection in depedency of driving conditions
02) TAKING OUT
a) taking of notoriously noisy power unit, or compressor out of the main boat
b) {engines, turbines, blades} combined with internal ducts for air ventilation system, taken out of the building, i.e. placed on the buildings elevations
c) sound of bird's predator, previously registered on a tape, and played back, can be used scarring away the birds, notoriously flying near or around the airports
09) PRE-ELIMINARY ANTI-ACTION
(COUNTER-ACTION)
surrounding sounds
counter-acting acoustic waves
active earphones
piezoelectric anti-impact system for cutting tool
16) EXCESSIVE (OR PARTIAL) ACTION
a) in close fit of both piston and cylinder of the engine
material allowance left in fit on inner side of cylinder destined for lapping
b) to spray excessively paint, and then to remove the excess of the paint
c) to fulfill the fuel tank, and then to remove the excess of fuel
03) LOCAL QUALITY
a) dustless excavation of coal
- the dust is captured by tiny droplets inside of the water cone
- bigger droplets outside of the cone keep the dust in a place
other examples:
b) weighed average from marks
c) weighed estimation produced for rankings of computers, printers, etc.
10) PRE-ELIMINARY ACTION
b) parking of hard disc reading/writing heads (when it is needed)
OFF (parking mode)
ON (operational mode)
blowing off of the (potentially chocked) nozzles in printing catridges
17) ANOTHER DIMENSION
a) two colliding tools in 1D should be rearranged into 2D plane, likewise, tools colliding on 2D plane should be rearranged into 3D space
b) to stack vertically containers, chairs, laptops, etc.
c) science of complex symmetries in crystalography
d) use of Lie algebra, in analysis of structures of atoms (in studying of electron shells, around atomic nuclei)
04) ASYMMETRY
a) pneumatic tyre asymmetrically reinforced from outside, due to contact with pavement curb
b) left- or right-handed rules of priority, in right of road
c) slanted concrete mixer, blender,
d) asymmetrically built conjuctions, handles
e) asymmetrically defined functionality of the "trap-the-door" mechanisms
f) asymmetrically built car, due to either left- or right-sided driver's sit
11) BEFOREHAND CUSHIONING
a) for instance: a method of "dressing" of the cut tree branches
(this action, actually forces a tree to beforehand reaction, to gather healing substances)
a pressure band
b) driver's airbag
c) masking of the chosen elements, within patches on the object, before its painting
18) MECHANICAL SELF-INDUCED VIBRATIONS (IN RESONANCE)
a) piezoelectric engine - a conceptual design
electric circuit of inducement
spring based tightments for set of two discs
direction of relative movement of upper disc
direction of aerial wave & relative movement in lower disc
both sided metal plating of layer ceramic material fasten to lower disc
b) quartz generators, in electric circuits
05) MERGING
a) several computers combined into functionning network
b) a hedge made of pales
c) textiles made of wool/poliestre/cotton fibres
d) roofing tiles combined into coverage of house roof
e) mobile concrete mixer, mobile crane, refrigerator, merged into single mobile machine unit, combining of the stationary machines with mobile undercarriages
12) EQUIPOTENTIALITY
a) a sequence of linear movements is replaced by single seamless movement on section of arc
a heavy element of the press, lifted up, and carried away usually in sequence of linear movements, is replaced with press deflected on remotely fasten long arm
b) dissolvable surgeon threads
c) rather to cool down stuck inner object, than to heat up other bigger outer object, which seizes the former one
19) PERIODICAL ACTION, OR PULSED ACTION
a) hammer drill
b) pulsed laser, against lasers of continous operational mode
c) 'pseudo-analogue' driving (PWM) (Pulse Width Modulation)
d) pulse DC power unit, against conventional DC power unit
e) pulse amplifiers
f) step motors
06) UNIVERSALITY
a) a helmet in use, within field conditions, rendered as:
a1) spade
a2) frying pane
b) universal "handy-tools"
Swiss Army knife
c) sets of universal kitchen robots, mixers, blenders, with operating actuators (rasps, juice extractors, etc.)
13) INVERSION (UPSIDE DOWN)
a) for instance: in reversing the working mode of vacuum cleaner (then, vapour could be used in cleaning of carpets)
b) to turn mounted object upside down, on assembling line
c) turning (object in move, while motionless turning tool), against milling (mobile milling cutter)
d) binary tree's structure is sought from root to leaves in one (in-depth) search algorithms, while another algorithm seeks throught nodes from leaves to root
20) CONTINUITY ACTION OF USEFUL ACTION
a) enlarging drill, operating in both directions
b) nozzles of catridge, printing also in returning direction (without idle mode)
c) steam turbines of generators for one power plants, working continuously (in optimal mode), while the others working, as pump-storage power plants, in aim of storing of energy for afternoon hours
(mode: pumping of the waters into upper reservoir on mornings, while emptying upper reservoir into lower one on afternoons)
07) EMBEDED STRUCTURES (nested "Dolls" - Matryoshka)
a) retractable car radio antennae, retractable fishing rods, etc.
c) radiators of ultrasound welders
14) SPHEROIDALITY, CURVATURES
a) applications of:
bearing rollers, spirals, shafts, spheres, demi-domes
b) replacement of linear movements by circular movements
c) application of arcs in architecture demi-domes in vaults of building
d) circular accelators (synchrotrons / magnetrons), in place of concept of linear accelators of particles
e) extensible, retractable measuring tape
21) SKIPPING, QUICK MODE, OR PACE OF REALIZATION
a) wood-borne materials in quick thermal processing
b) laser treatments of biological tissues or in processing of hardly processed materials (both extremely soft and extremely hard) without thermal deformations, scorching, burnings
c) pico-second pulsed lasers (femto-second lasers) against laser of micro- and nano-seconds pulses
d) steel hardening process in abrupt temperature changes


22) "BLESSING IN DISGUISE" (CONVERT HARM INTO BENEFIT)
a) burning out in outskirts of the main fire, to cut of fire's fuel
b) to blow out the blazing fire from top of oil well in detonation blast
c) permafrost materials are to be 'treated' with liquid nitrogen
liquid nitrogen
the material's permafrost rapidly "liquefies"
28B) SUBSTITUTING OF MECH. SYS. WITH ELECTRO-MAGN. SYSTEMS
B) magnetic borne pressure of the machined materials
object's pressure
pneumatico-magnetic pressure cushion
C) mobile fields instead of static fields
D) heterogenous fields
34) DISCARDING & RECOVERING, (REJECT & PARTS REGENERATION)
a) dissolvable medication capsules made of (biologically inert material)
b) rocket's stages subsequently discarded during the flight
IV stage
III stage
II stage
I stage
c) cornstarch-based packages for dry products
23) FEEDBACK PRINCIPLE
a) basically, as well as particularly:
input signal
object
output signal (indoor's temperature regulation)
closed loop with negative feedback
(temperature)
b) autopilot provided with 3-axis gyro system
c) robot arms movement's back-controlled in set of: 1) diode - 2) photodiode -3) semi-transparent either: protractor, or: linear scale - placed in between
29A) PNEUMATICS & HYDRAULICS
- pneumatic automobile tyre,
- pneumatics (air-tight) dampers,
- automobile airbags,
- pneumatic "discrete", driving of operational actuators, for instance: in automatic welding of packaging covers made of plastic wrapping
on the figure above, in blue: approximate section of automobile pneumatic tyre
35) CHANGING STATE, PARAMETERS, PROPERTIES OF MATERIALS
1) high temperature food processing
2) low-temperature food preserving
3) a product ready for further processing step (for submerging in liquid chocolate)
temp >>0°C
temp < 0°C
24) INTERMEDIATE MEANS, "FITTING" PRINCIPLE
a) in electronic circuits fitting either of:
- impendance,
- or resistance, of input source to the receiver
Rinput
Rreceiver
(Zinput) (input impedance)
(Zreceiv.) (receiver's impedance)
fitting of input impedance to receiver's impedance
b) fitting in mean of:
- pressure-flowing (fluid mechanics),
- loading of force moments, in transmission gears (mechanical fitting)
- stress of two interfacing surfaces (endurance)
29B) PNEUMATICS & HYDRAULICS
- automobile brakes,
- in driving of plane elevator,
- where the precision of driving is needed, as well as enormous force transition
F2 >> F1
brake's block
hydraulics in communicating vessels
F2 = S2/S1 F1
36) PHASE TRANSITION
a binary, phase transition cycle for refridgerator construction
heat flows
heat flows from surrondings (red arrows directed to blue heat exchanger)
compressor
necking
liquefied ammonia, heat carrier, (freon, ammonia, etc.)
circulation of an external fluid in heat exchanger
temp <0°C
temp >0°C
25) SELF-SERVICING PRINCIPLE
self-servicing line's deicing system:
heat
ferromagnetic on line
temp <0°C
paramagnetic on line
temp >0°C
constant regeneration of the glower of the halogen lamp
tungsten sublimates to halogens then, to redeposit on tungsten glower
30) FLEXIBLE FILMS, FOILS, MEMBRANES
a) not wettable film prohibits evaporation of water
b) wrapping packaging based on plastic, air-pumped bubbles
c) flattable balloons, domes, barriers
37) THERMAL EXPANSION
1) thermal shaft fitting
2) state of thermal ballance
temp > 0°C
temp < 0°C
26) COPYING, IMAGING PRINCIPLE (application of optical mapping)
a) use of ultrasounds
ultrasound mapping
b) magnetic resonance mapping
c) X-rays radiography
d) in mapping of material structures the application of:
- infrared
- ultraviolet
- basically of optical methods
e) use of fluoroscence and of scintilation's materials
31) POROUS MATERIALS
a) aerated concrete (porous concrete)
b) porous abrasive tools
c) polyurethane foam
d) catalysing surfaces in chemistry
e) "vacuum" as a "construction building material"
f) openwork structures reinforcements
g) porous, sponge materials in kitchen getters
porous grinding wheel
abrasive grains
binding material
pores in grinding wheel allow for: self-regenerating process, draining of abrasing heat, collecting and depositing of chips
38) STRONG OXIDANTS
a) oxygen O_2
b) ozone O_3
c) (indirectly vapour) H_2O
in oxidation of metal's surface (iron with over-heated vapour under pressure, at 300°C degree)
the surface with protection layer obtained due to oxydation
27) INEXPENSIVE SHORT-LIVED OBJECTS (CHEAP CADUCITY, & OF DISPOSABLE MATERIALS)
a) kitchen utensils, dishes, cutlery made of plastic
b) disposable syringes, gloves, etc.
c) plastic bags, packaging wrappers, etc.
d) printing head integrated with ink catridge
(formerly, each printer possessed built-in printing head)
(presently, each ink catridge has its own printing head)
32) COLOUR CHANGING (ALTERNATING)
in lapping process for inner surfaces of engine pistons & cylinders, the probing of phoshorescence distribution can be used
39) NEUTRAL ATMOSPHERES, INERT ENVIRONMENTS
a) C_{02} extinguishers
b) N_2 or He_2 proctection atmospheres in processing, and production
c) N_2 or He_2 protection atmospheres in storing of products, and materials, both raw and processed
28A) PRINCIPLE OF SUBSTITUTING OF MECHANICAL SYSTEM WITH FUNCTIONALLY EQUIVALENT ELECTRO-MAGNETIC SYSTEMS
electric field
to substitute with interaction of:
mechanical pressure or fastening
magnetic field
33) HOMOGENEITY
the two interfacing surfaces should be made of the same material
moreover, the similarities can be applied, regarding:
- comparable mat.'s hardness, chemical inertion, structures,
- comparable thermal expansion's coefficients, (in case of dental materials; metal-glass conjunctions),
- comparable electro-chemical potentials (in avoiding electro-chemical borne corrosion)
- same fatigue characteristics, and amortization specifics
40) COMPOSITE MATERIALS
1) elements of blades, rotors, airscrews in wind turbines constructions;
2) yacht's & cataraman's constructions;
3) elements exposed to ultra-strong, severe stress

04

Tasks

What to do?

Assemble in groups

Download Template

Start meeting in Teams / Put workshop on hold and be able to switch to ask questions

Fill the template (try to avoid homework!)