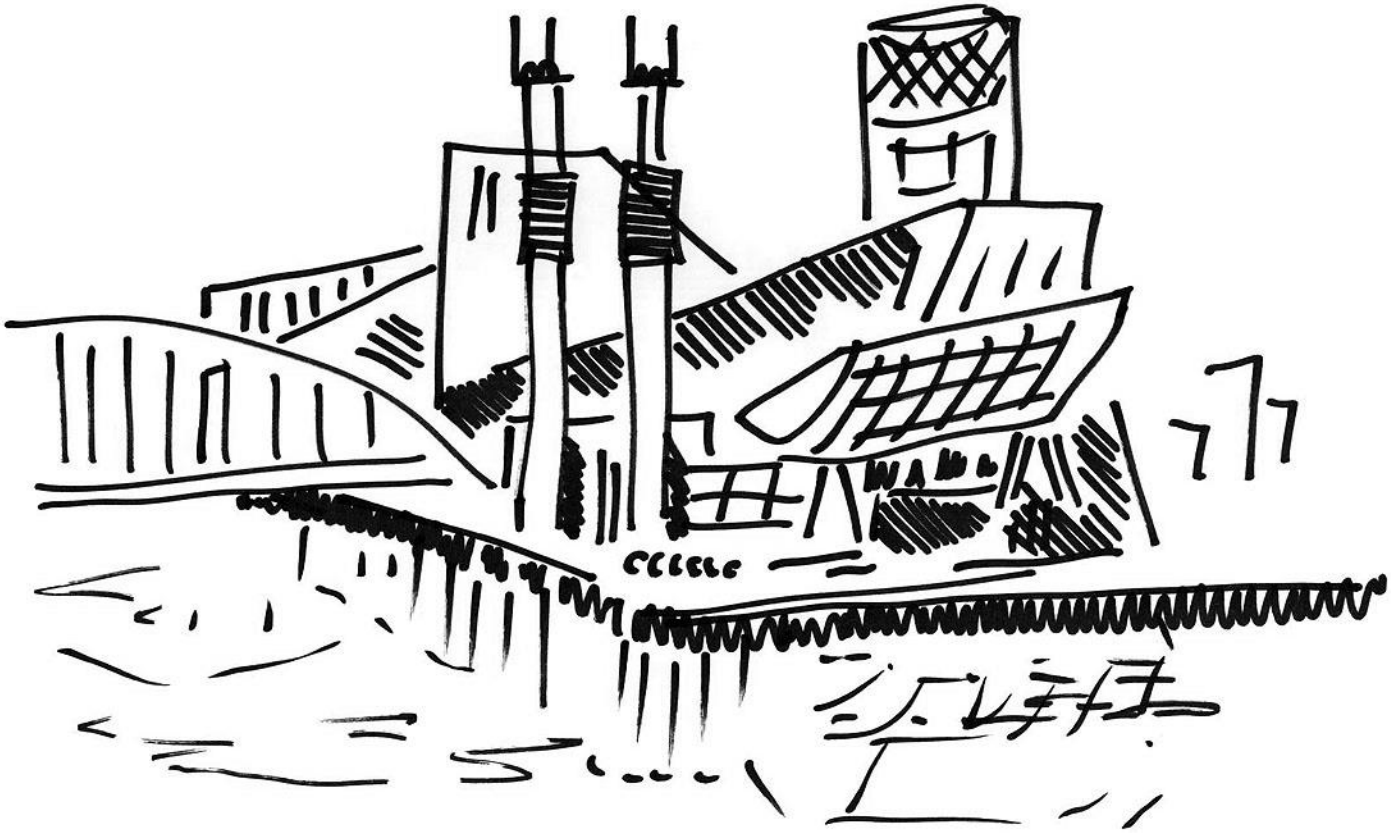
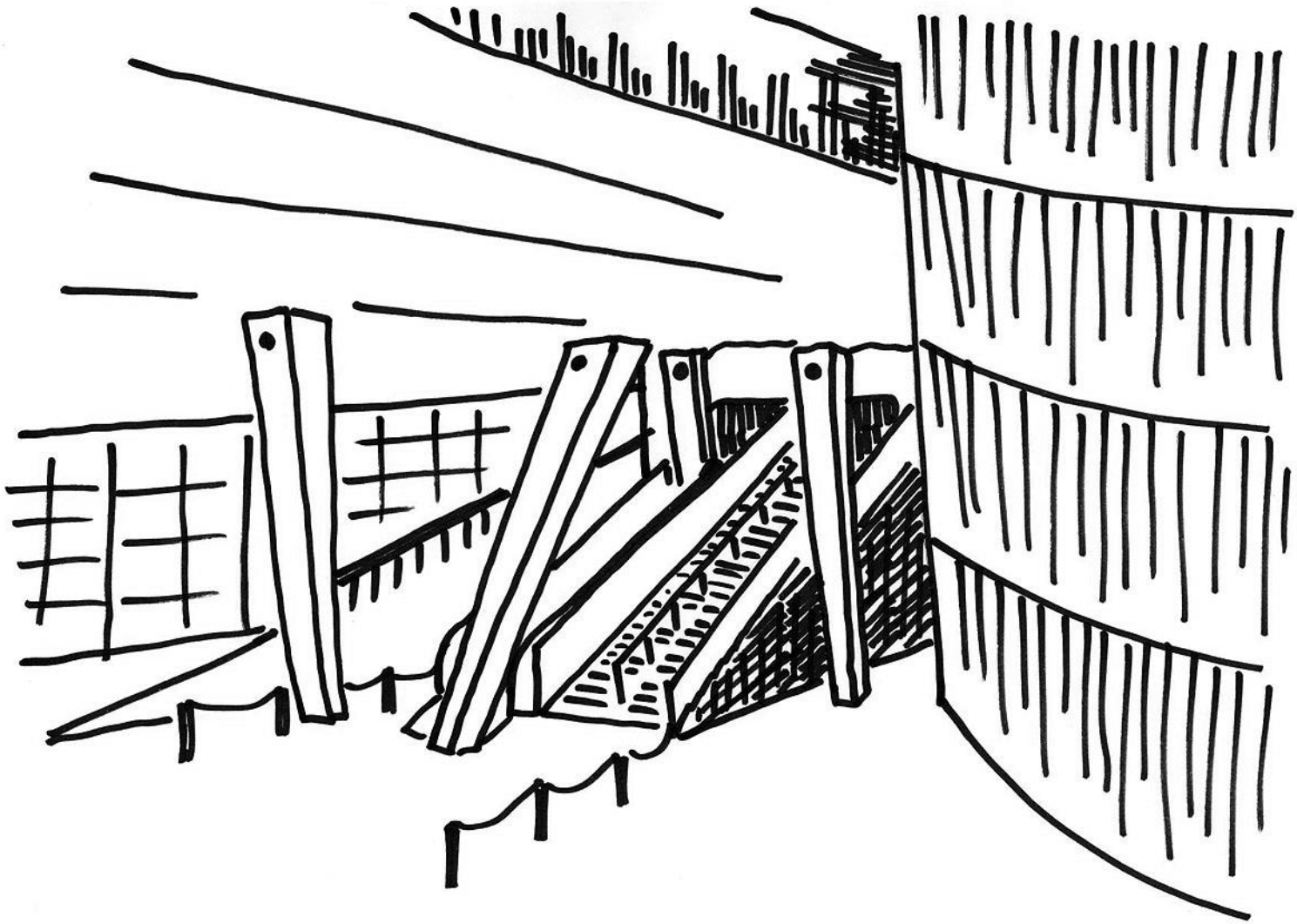
… IN A EUROPEAN TOWN

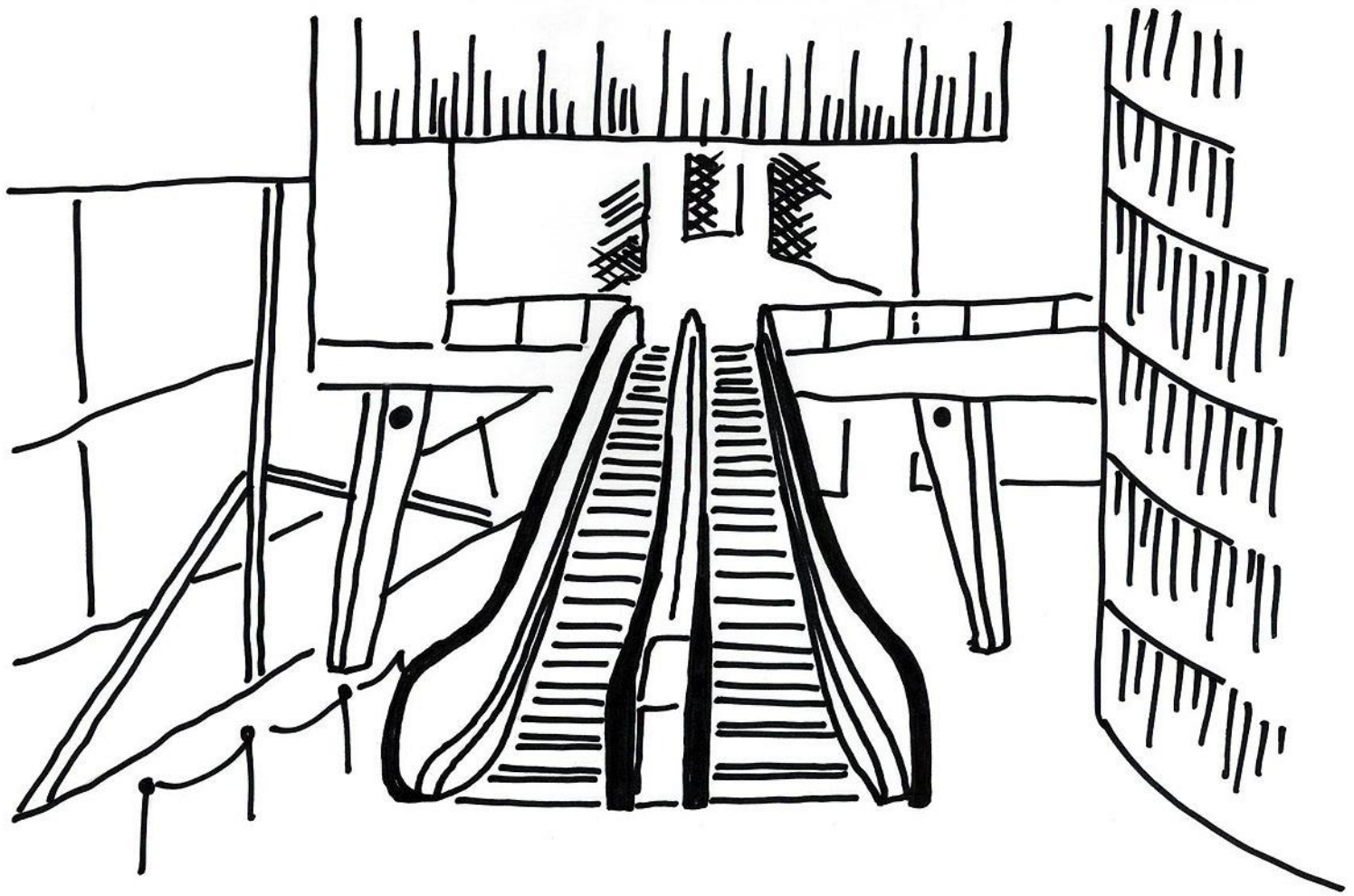
… IN A EUROPEAN THEATRE

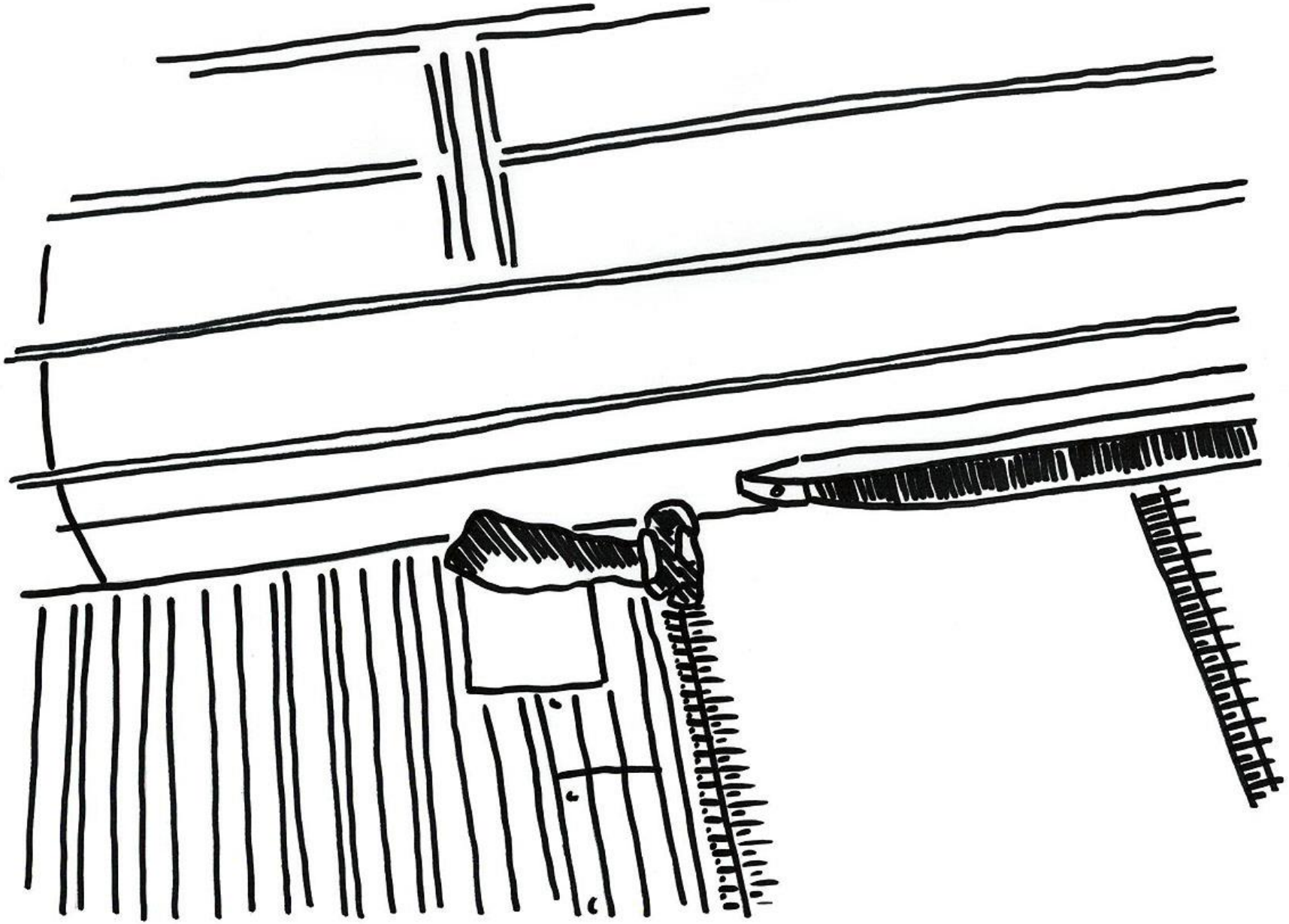


... IN A EUROPEAN FOYER



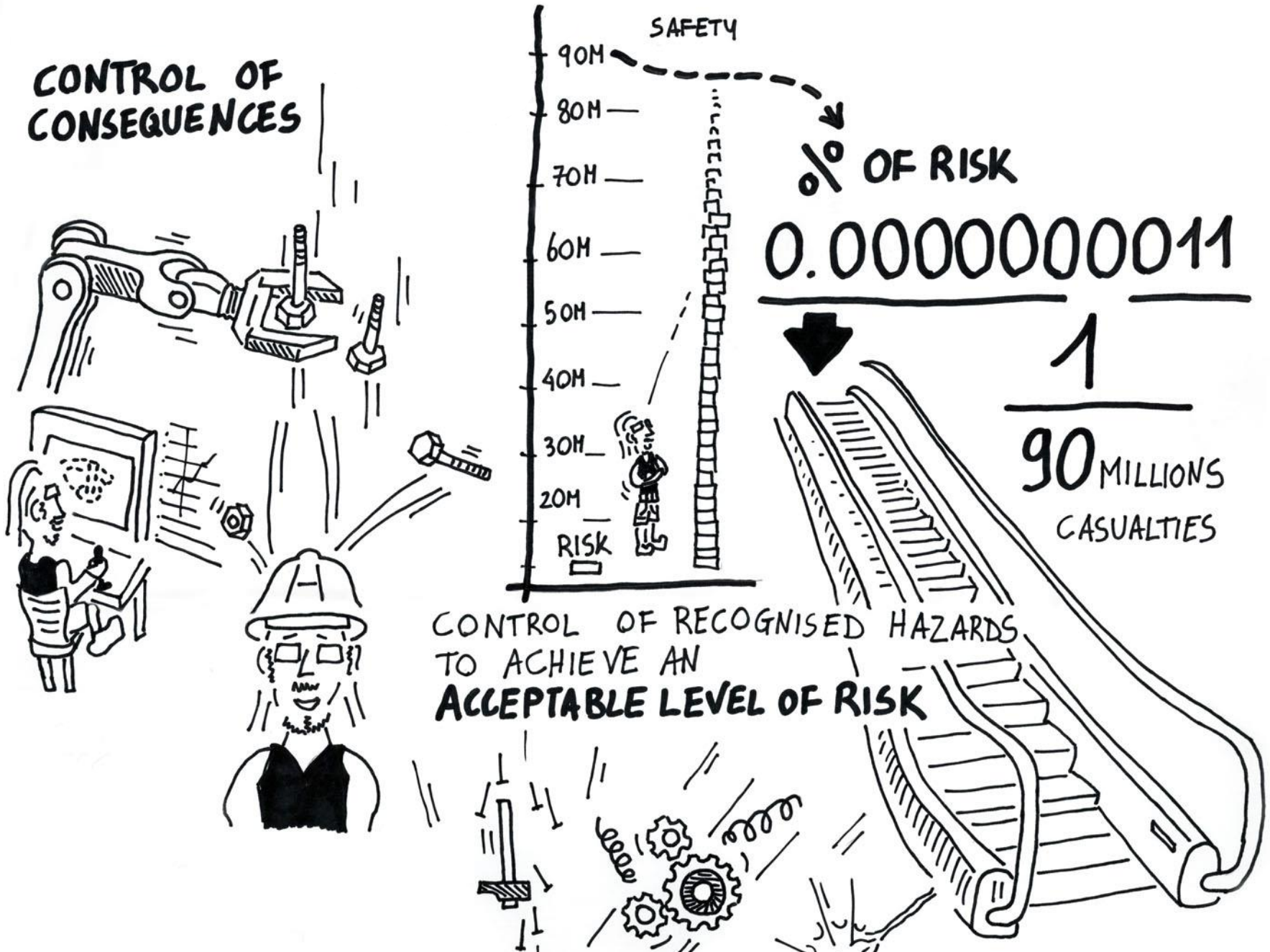
... GOING DOWNSTAIRS

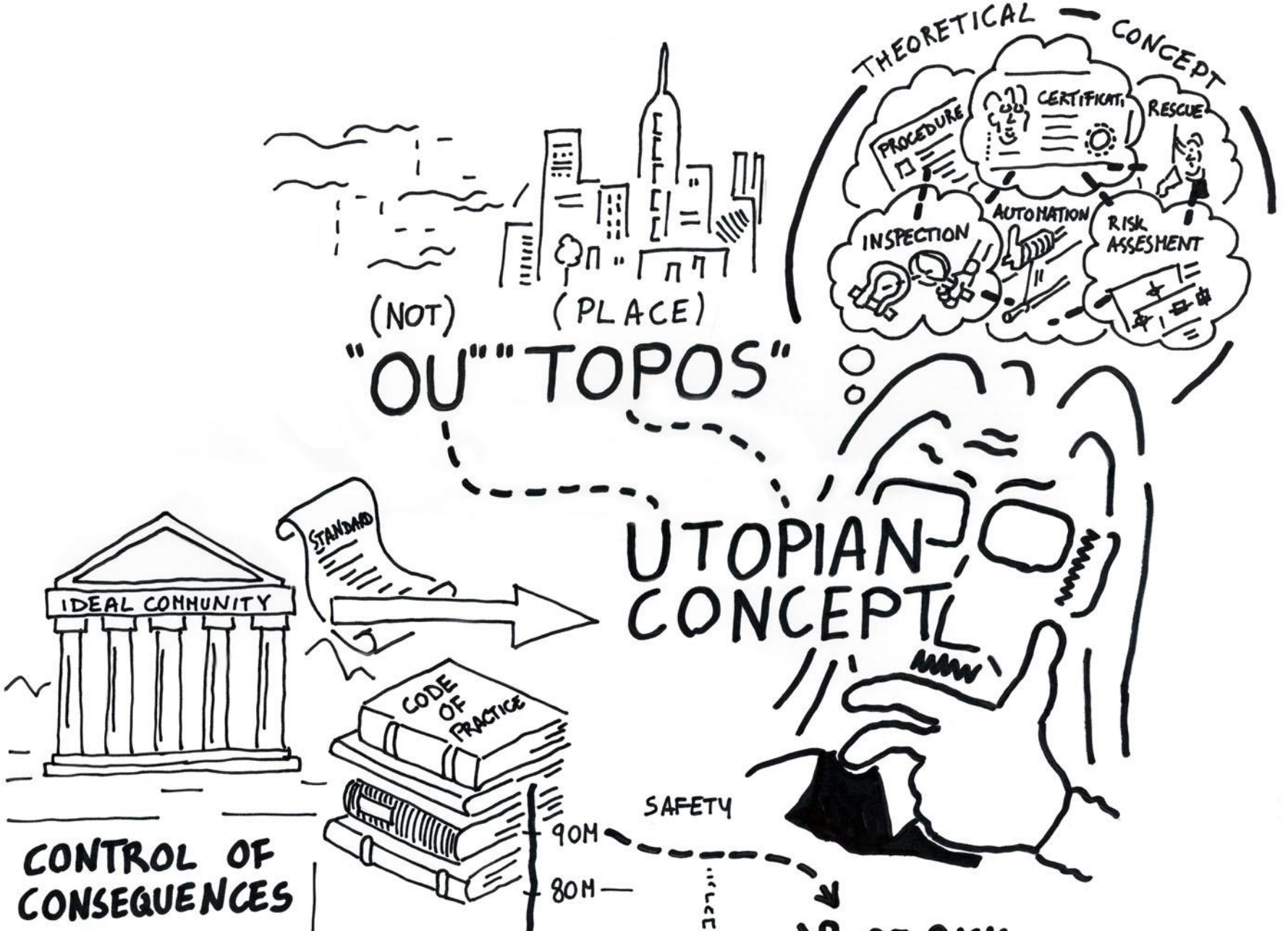




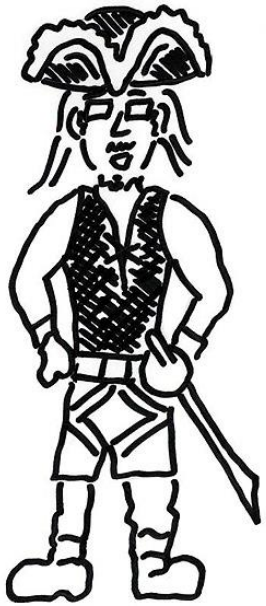

IS THE STATE OF BEING SAFE
SAFETY

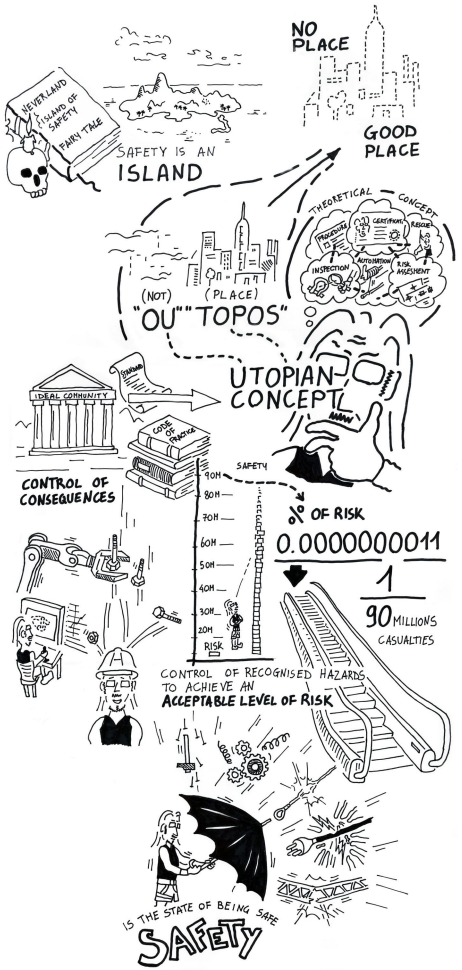

CONTROL OF RECOGNISED HAZARDS
TO ACHIEVE AN
ACCEPTABLE LEVEL OF RISK
IS THE STATE OF BEING SAFE
SAFETY


CONTROL OF CONSEQUENCES
SAFETY
90M
80M
70M
60M
50M
40M
30M
20M
RISK
% OF RISK
0.0000000011
1
90 MILLIONS
CASUALTIES
CONTROL OF RECOGNISED HAZARDS
TO ACHIEVE AN
ACCEPTABLE LEVEL OF RISK

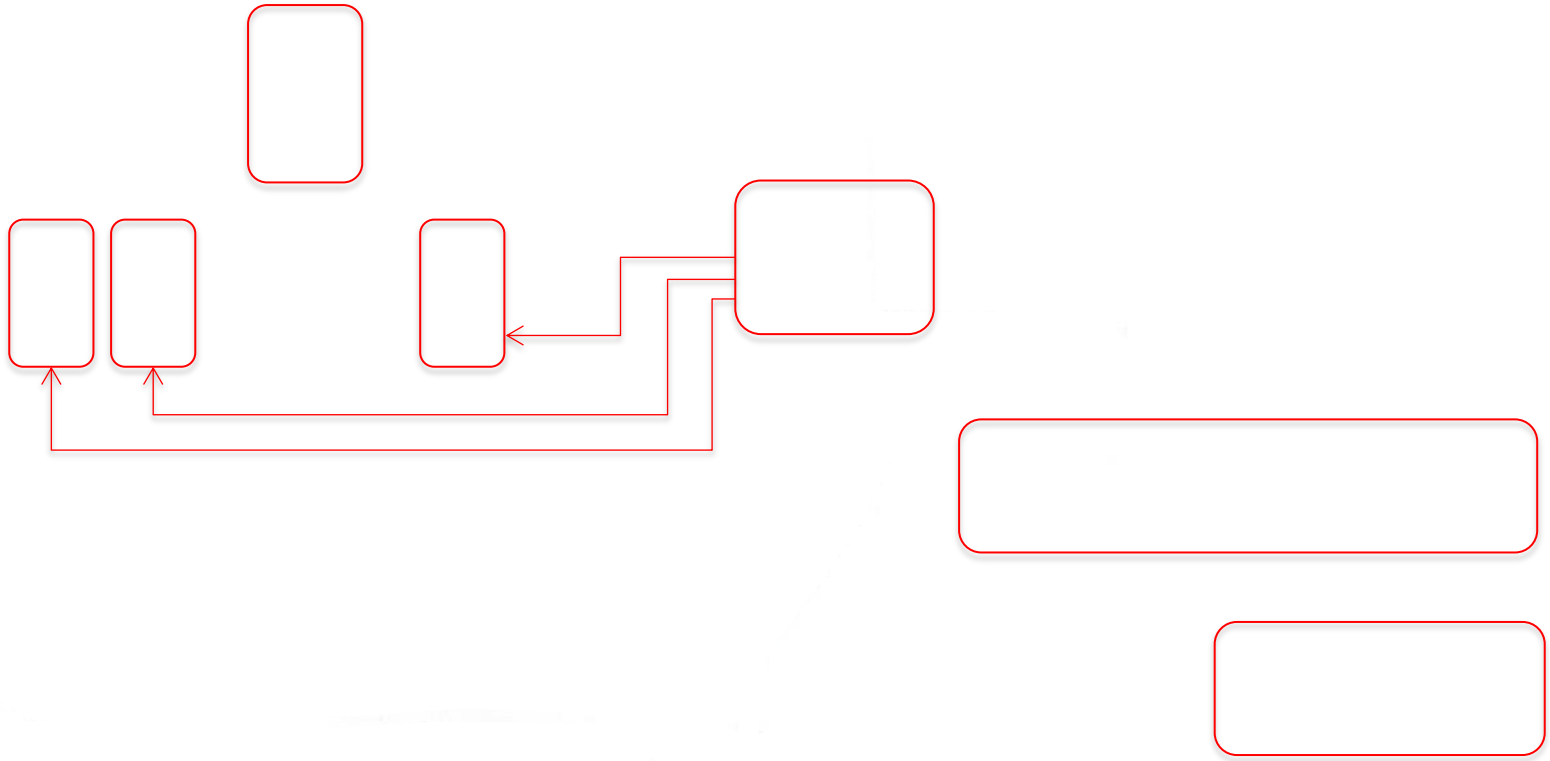

THEORETICAL CONCEPT
PROCEDURE
CERTIFICATI
RESCUE
INSPECTION
AUTOMATION
RISK ASSESMENT
(NOT) (PLACE)
"OU" "TOPOS"
UTOPIAN CONCEPT
STANDARD
IDEAL COMMUNITY
CODE OF PRACTICE
SAFETY
90M
80M
CONTROL OF CONSEQUENCES

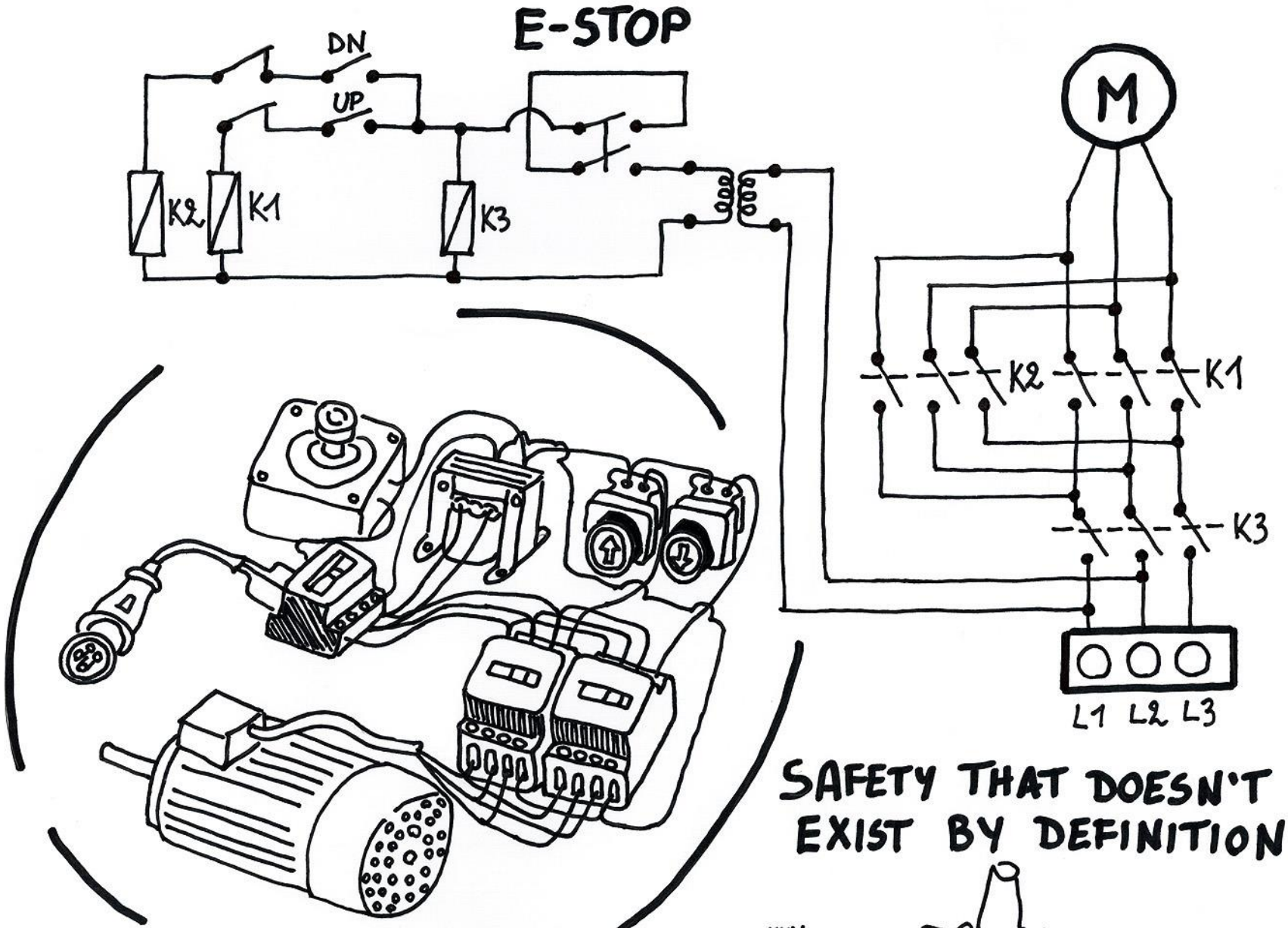
THE ISLAND THAT DOESN'T EXIST

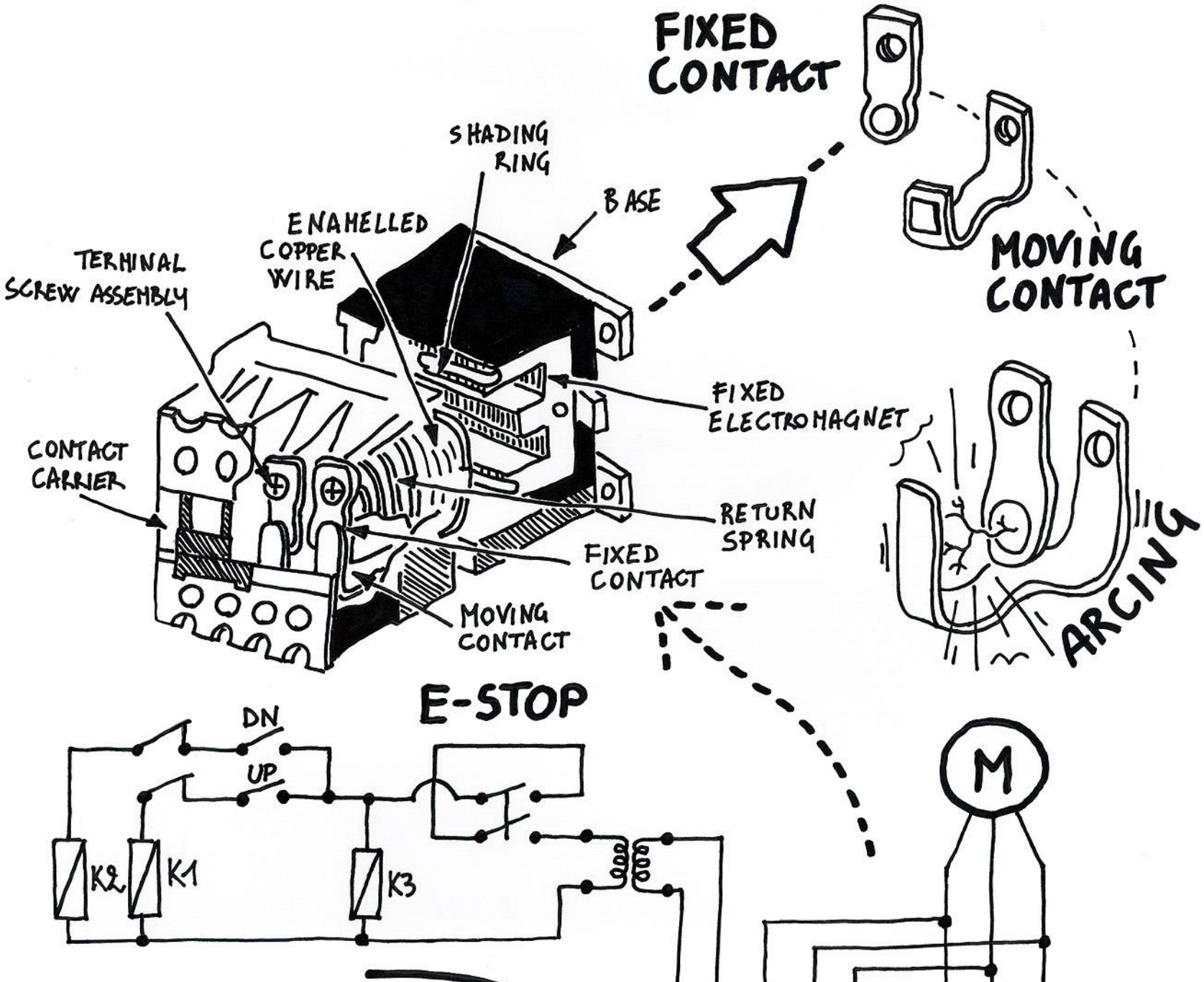


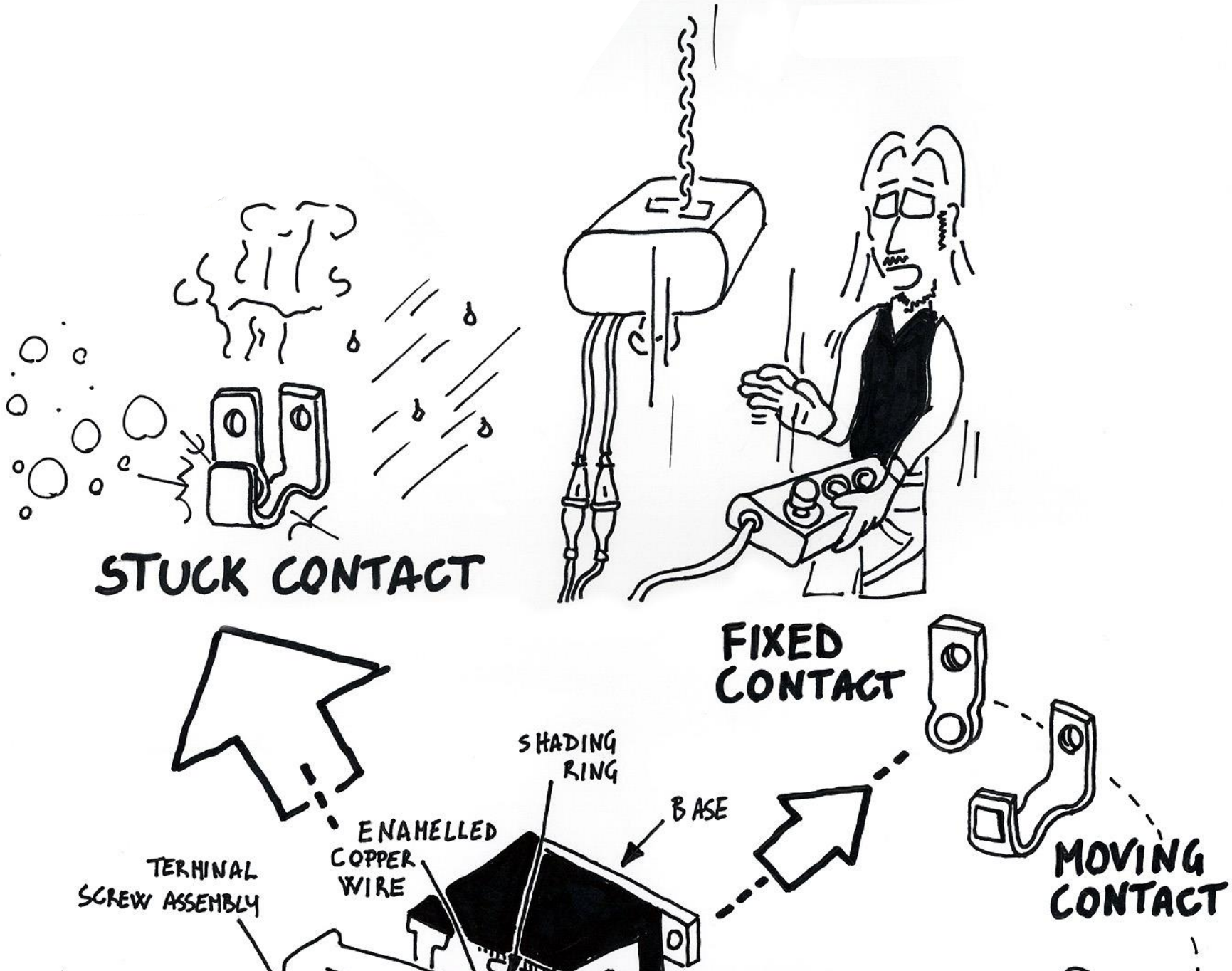


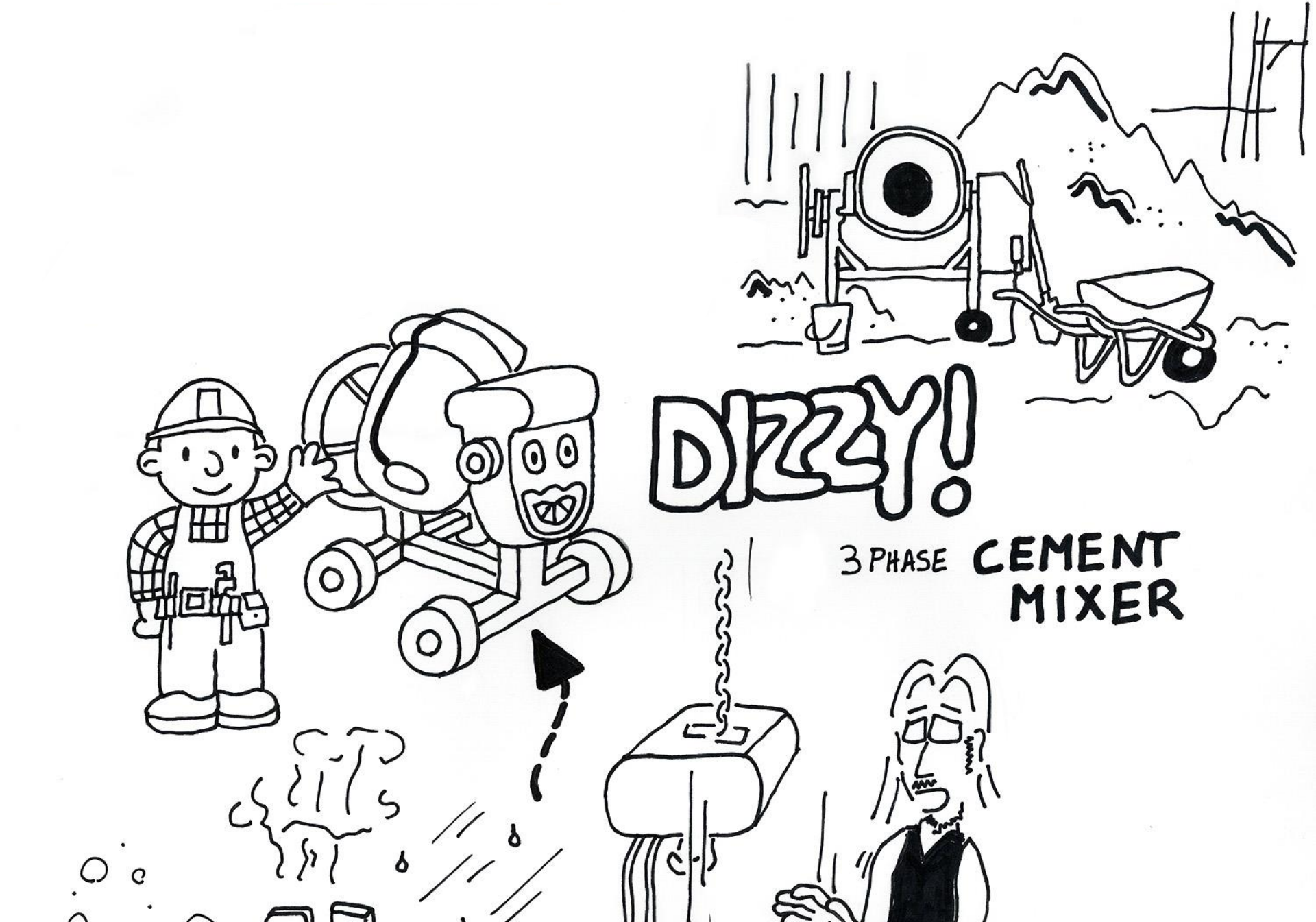
THE MYTH OF ABSENCE

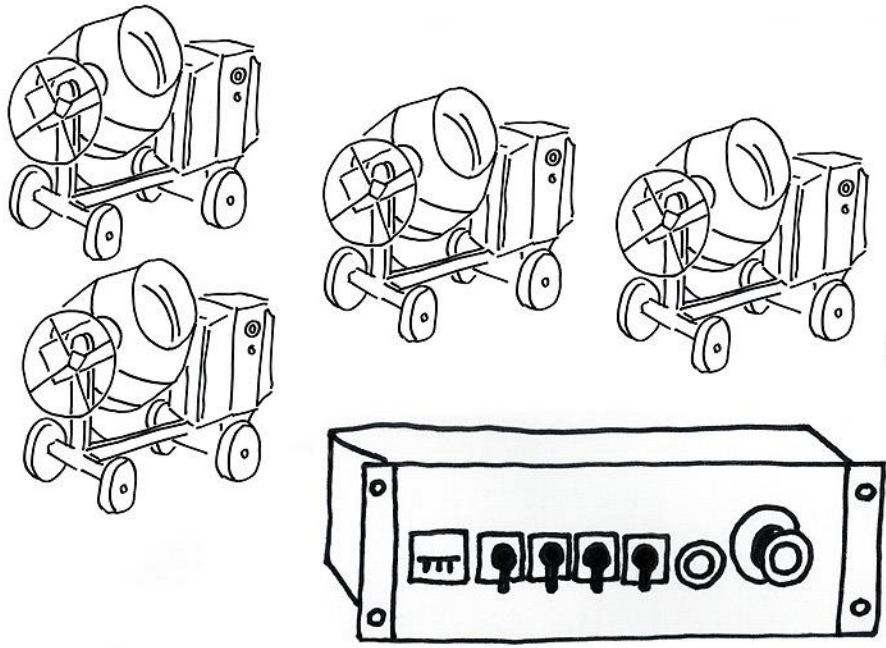



E-STOP
DN
UP
K2
K1
K3
M
K2
K1
K3
L1 L2 L3
SAFETY THAT DOESN'T EXIST BY DEFINITION
SKULL ROCK

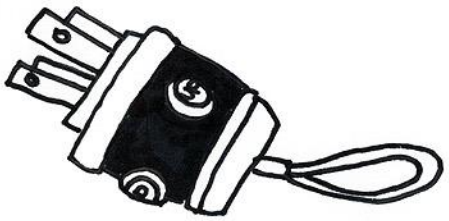

FIXED CONTACT
MOVING CONTACT
SHADING RING
BASE
ENAMELLED COPPER WIRE
TERMINAL SCREW ASSEMBLY
FIXED ELECTROMAGNET
CONTACT CARRIER
RETURN SPRING
FIXED CONTACT
MOVING CONTACT
ARCING
E-STOP
DN
UP
K2
K1
K3
M


STUCK CONTACT
FIXED CONTACT
MOVING CONTACT
SHADING RING
BASE
ENAMELLED COPPER WIRE
TERMINAL SCREW ASSEMBLY

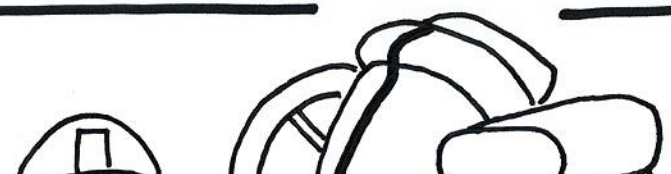

DIZZY!
3 PHASE CEMENT MIXER



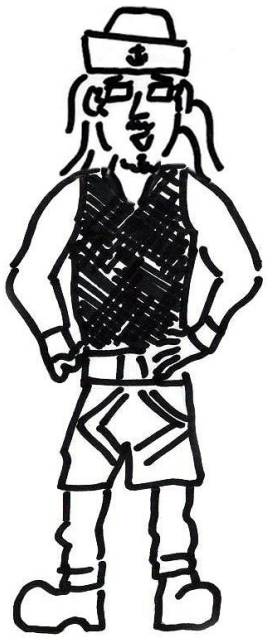
PICKLE



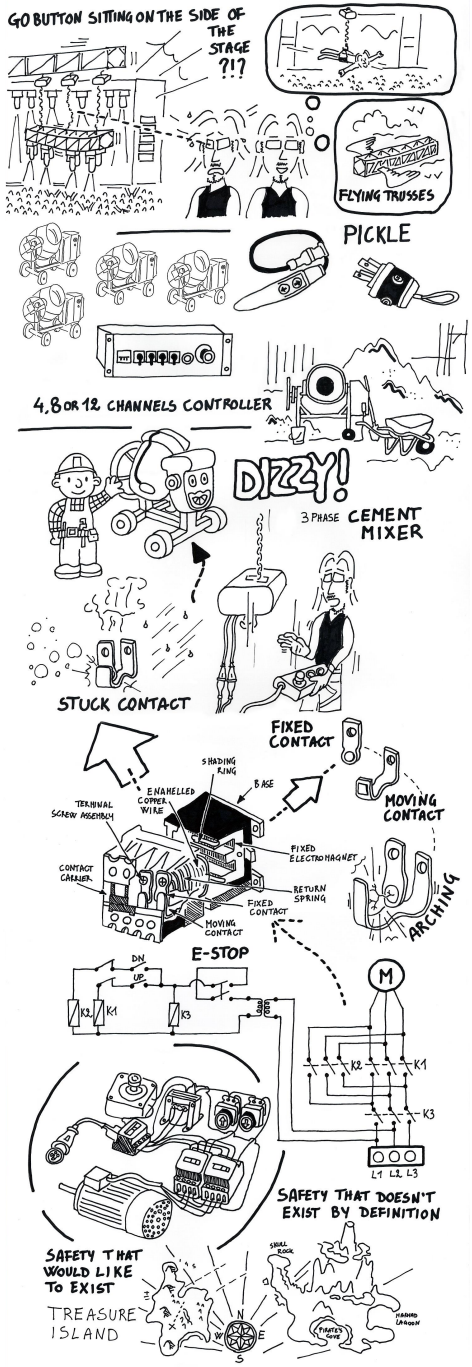
4,8 OR 12 CHANNELS CONTROLLER

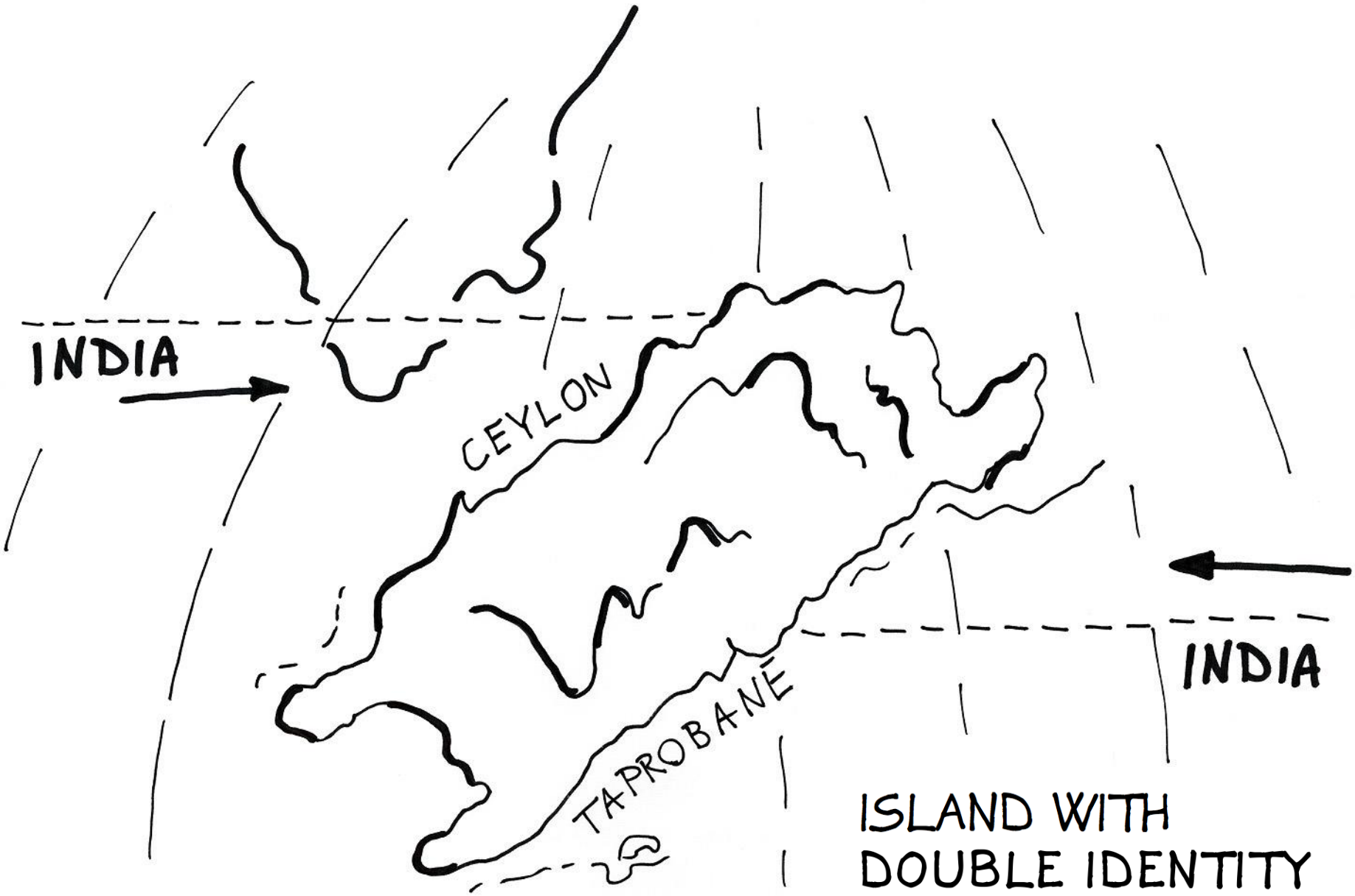


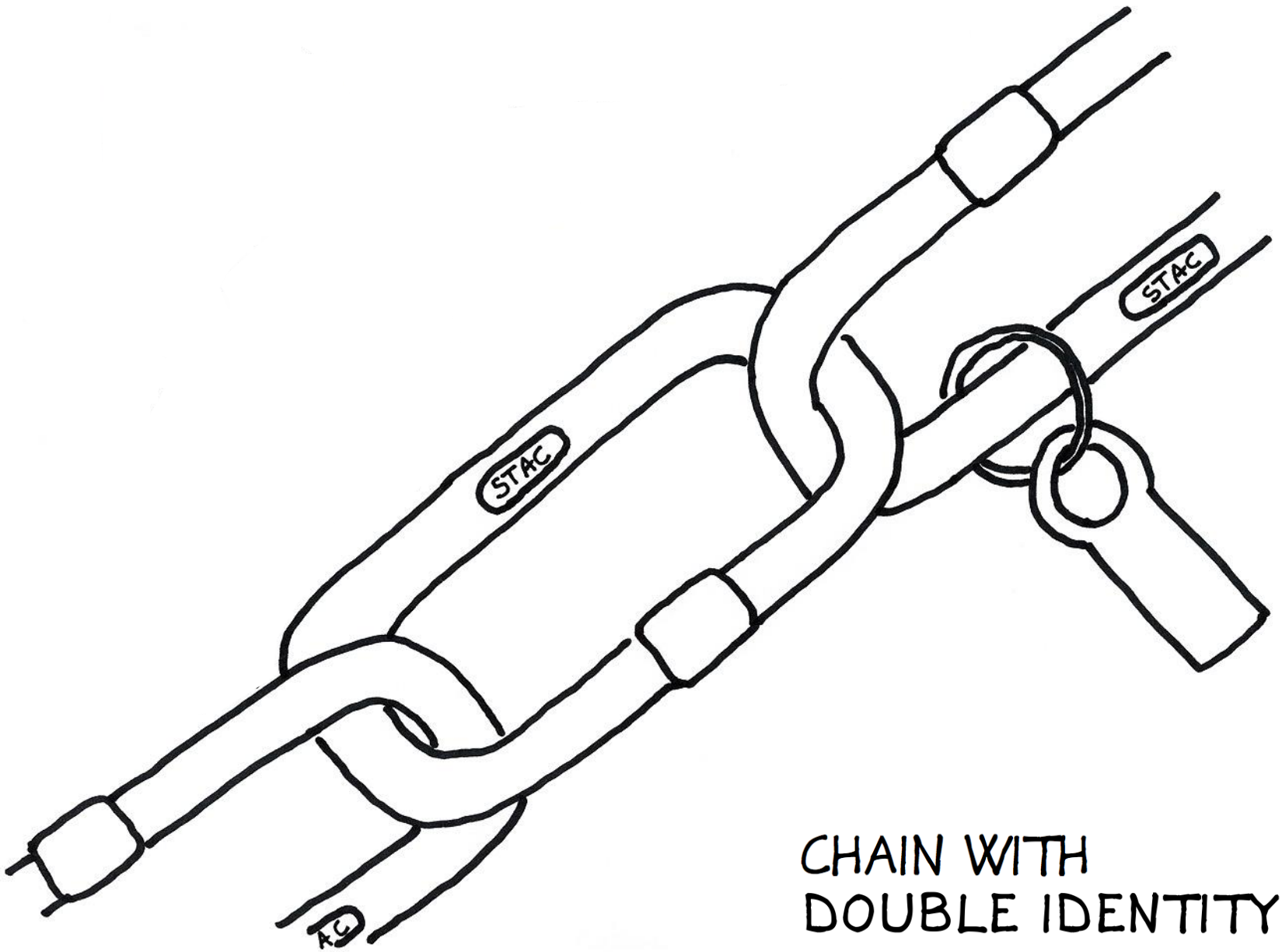
THE ISLAND THAT EXISTS TOO MUCH



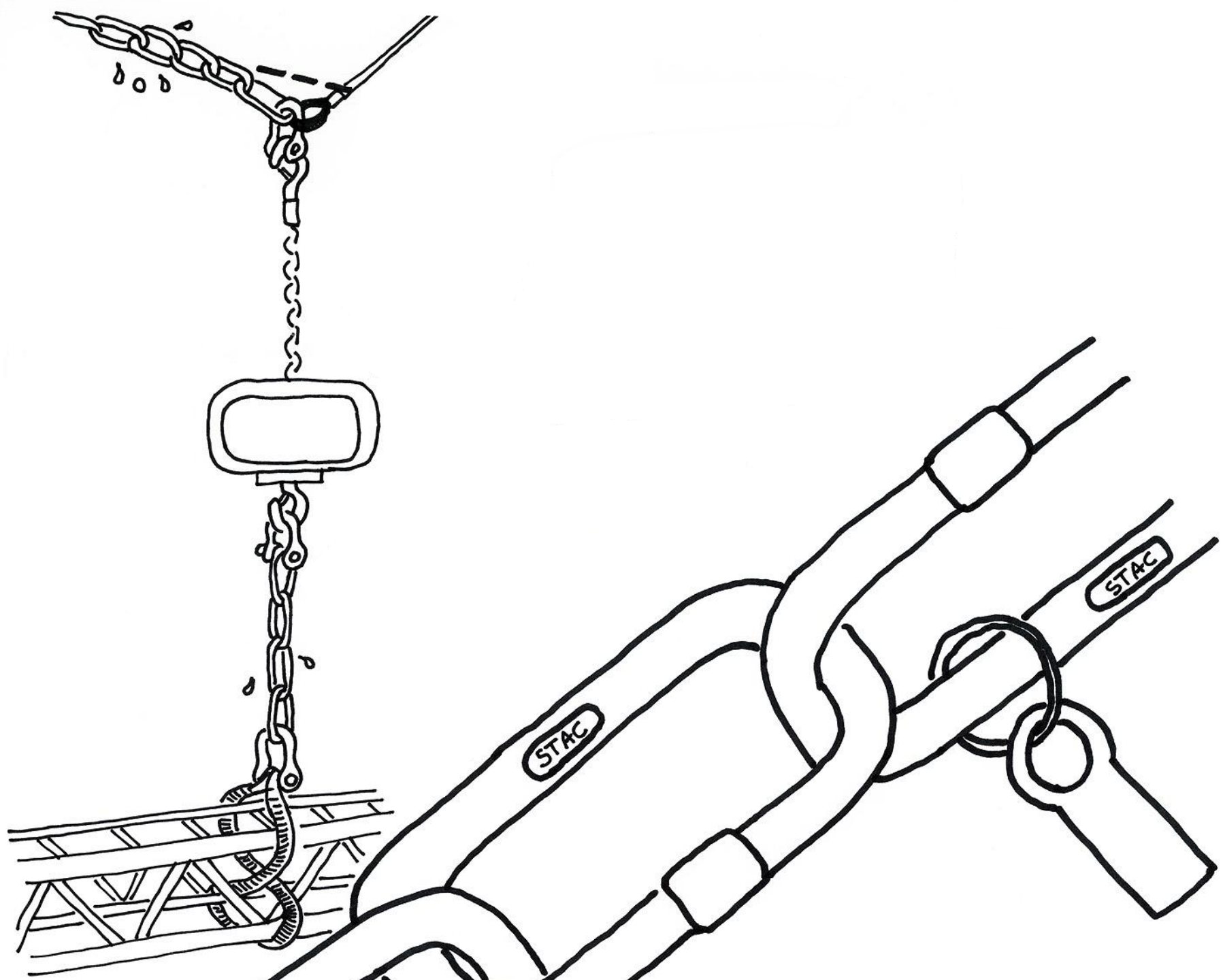
THE MYTH OF REDUNDANCY

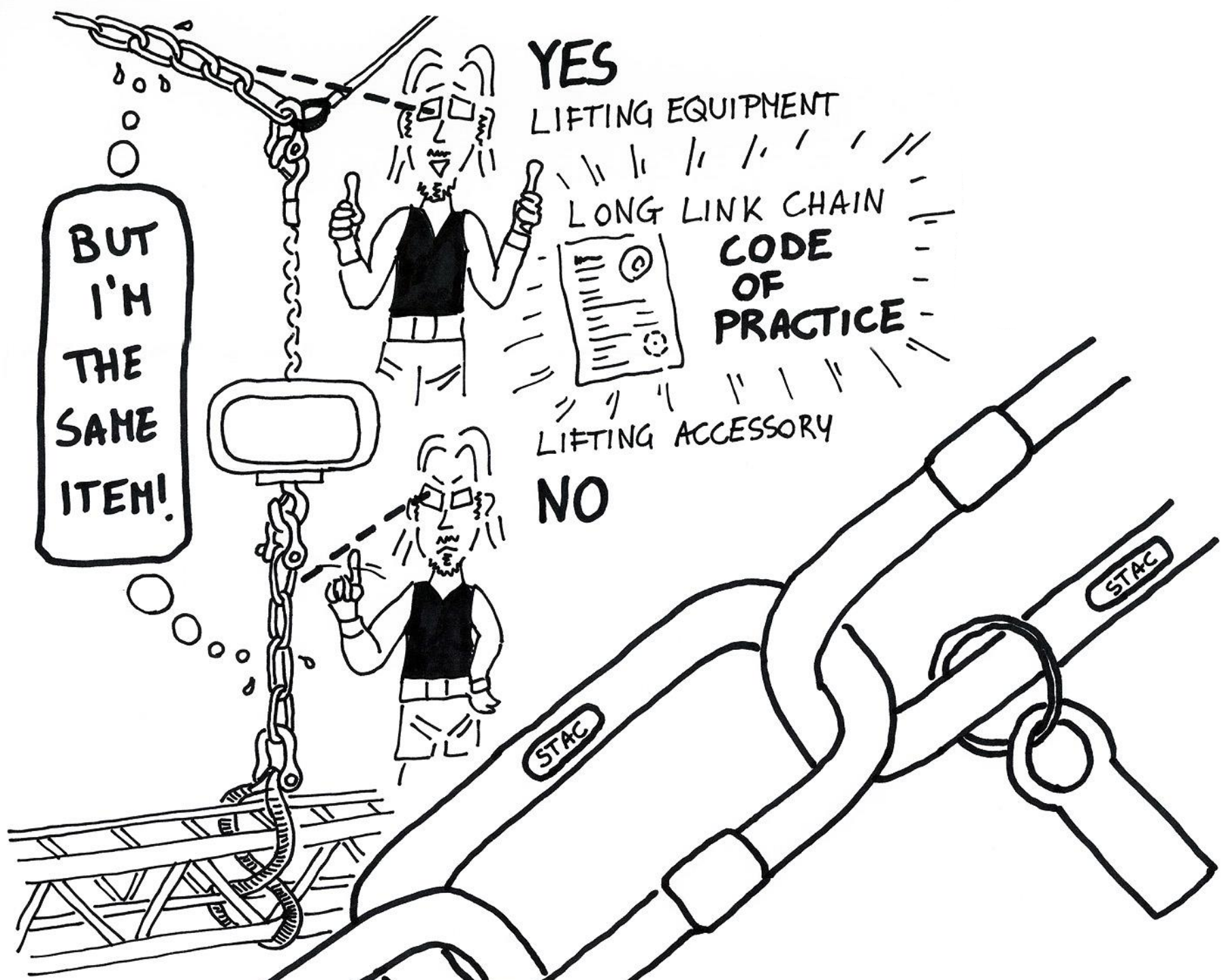



INDIA
CEYLON
INDIA
TAPROBANE
ISLAND WITH
DOUBLE IDENTITY



CHAIN WITH
DOUBLE IDENTITY


STAC
STAC


BUT I'M THE SAME ITEM!
YES
LIFTING EQUIPMENT
LONG LINK CHAIN
CODE OF PRACTICE
LIFTING ACCESSORY
NO
STAC
STAC

PASSIVE REDUNDANCY

X:1 2X:1

ACTIVE REDUNDANCY

ACTIVE COMPONENTS

ENCODER

PASSIVE COMPONENTS

CABLES

BRAKE

RELAY CONTACTOR

EXCEEDING MECHANICAL SPECIFICATIONS

YES

LIFTING EQUIPMENT

LONG LINK CHAIN

CODE OF PRACTICE

SAFETY

10:1

8:1

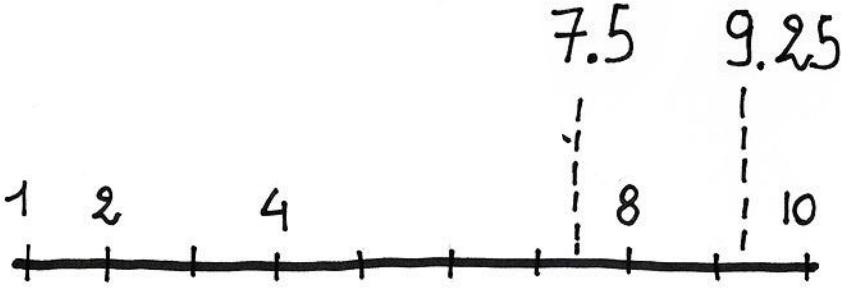
4:1

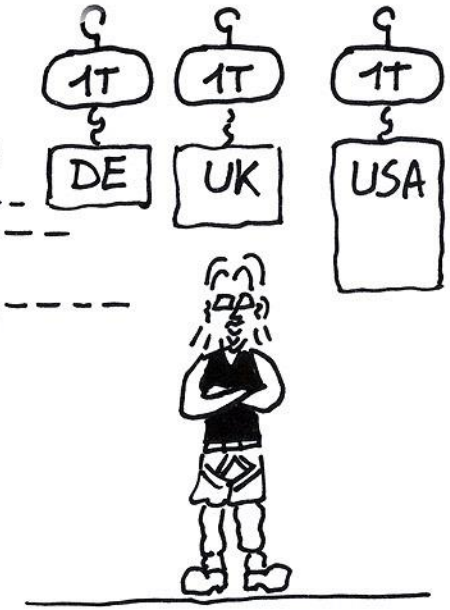
2:1

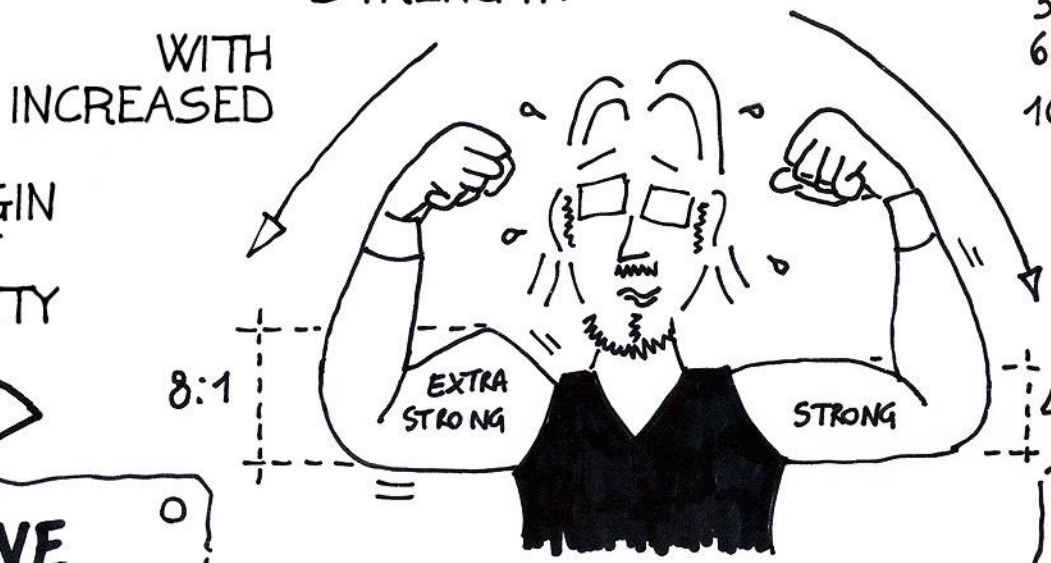
COEFFICIENTS

UNSAFE

WHY ?

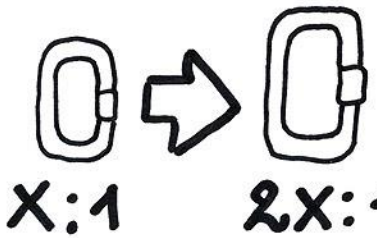


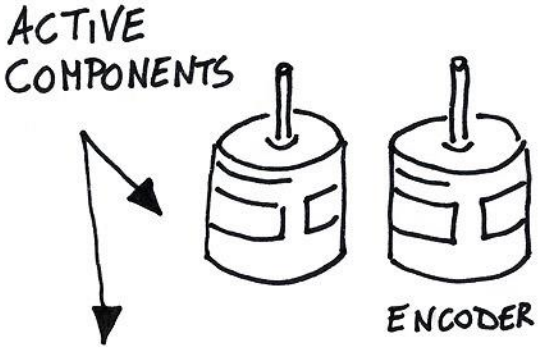


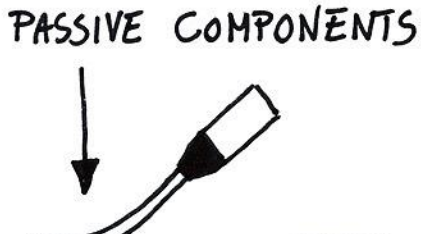


PASSIVE REDUNDANCY

ACTIVE REDUNDANCY







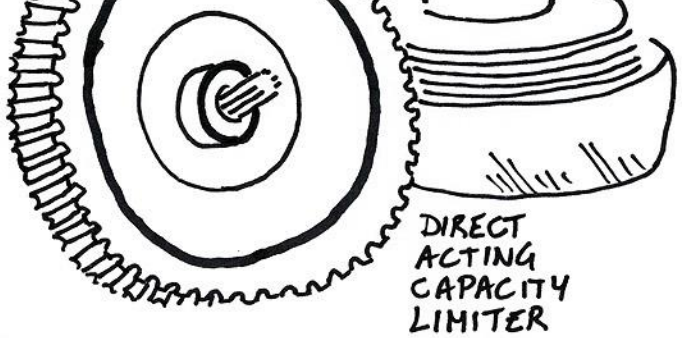
DOCUMENT

2006-42_EC_EN.pdf

SEARCH

REDUNDANCY

XXX HAS FINISHED SEARCHIN THE DOCUMENT. NO MATCHES WERE FOUND



APPLICATION OF EXTRA STRENGTH

PASSIVE REDUNDANCY

4:1 → X8

ADEQUATE -SAFE-

X4

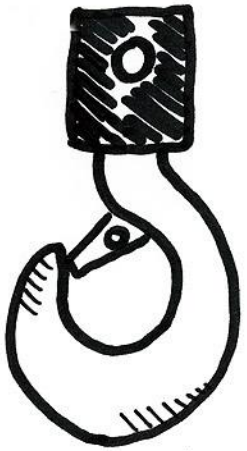
2:1 POSSIBLY SAFE

X2

1:1 NOT SAFE

MACHINERY DIRECTIVE 4.1.2.4

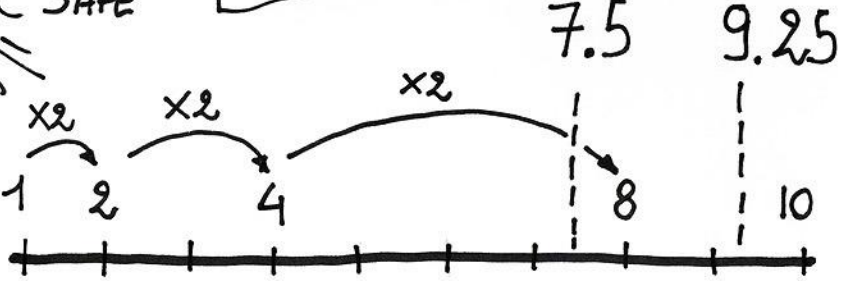
COEFFICIENT 4 IS ADEQUATE



APPLICATION OF EXTRA-EXTRA STRENGTH

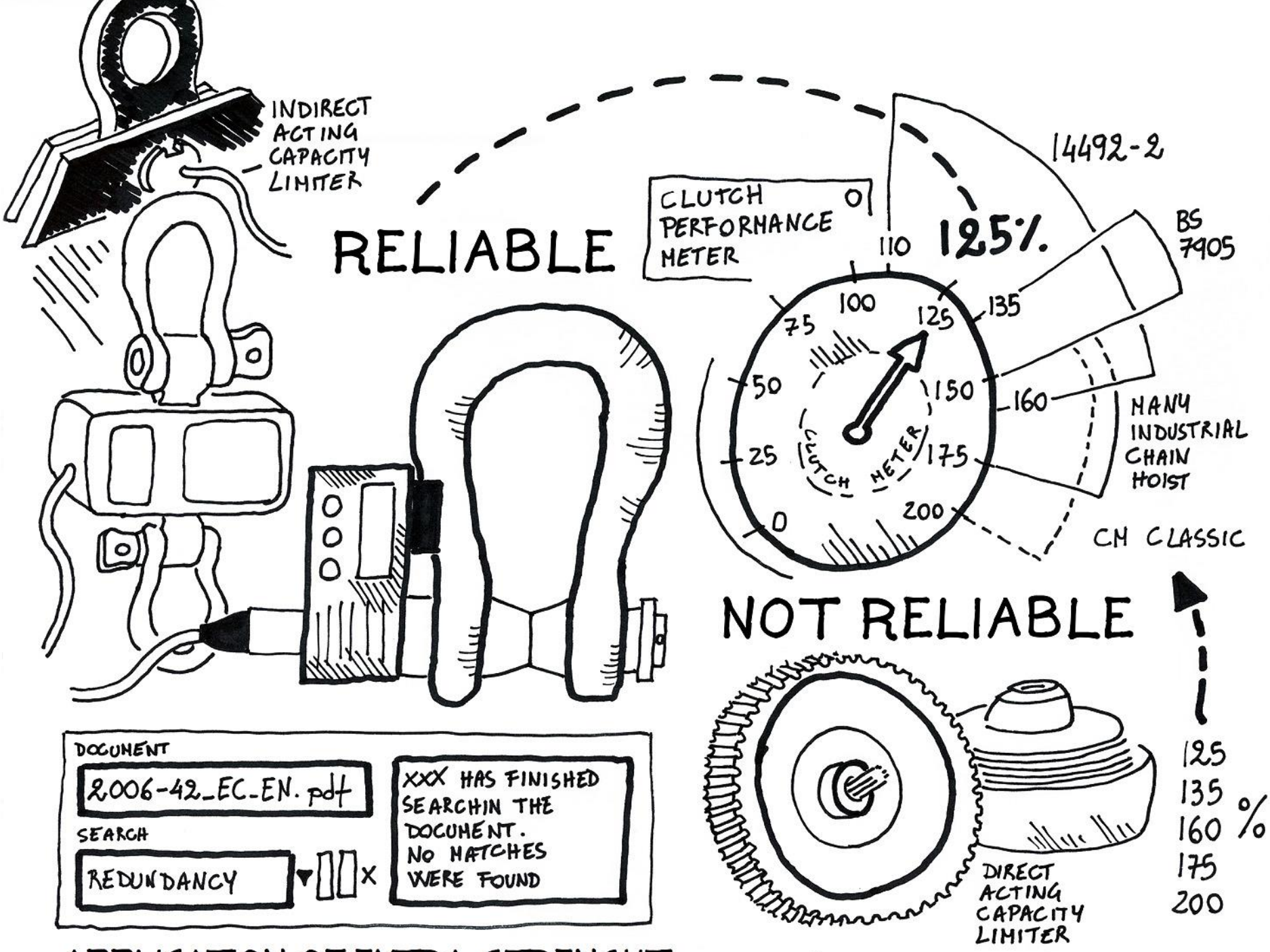
8:1

DOUBLE PASSIVE REDUNDANCY

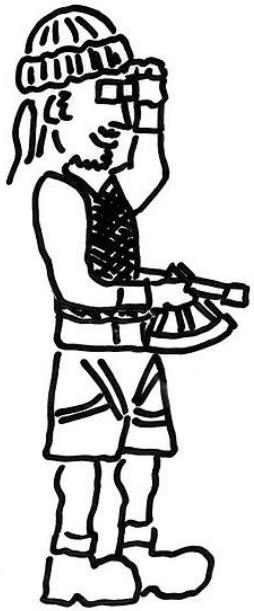


WHY ?

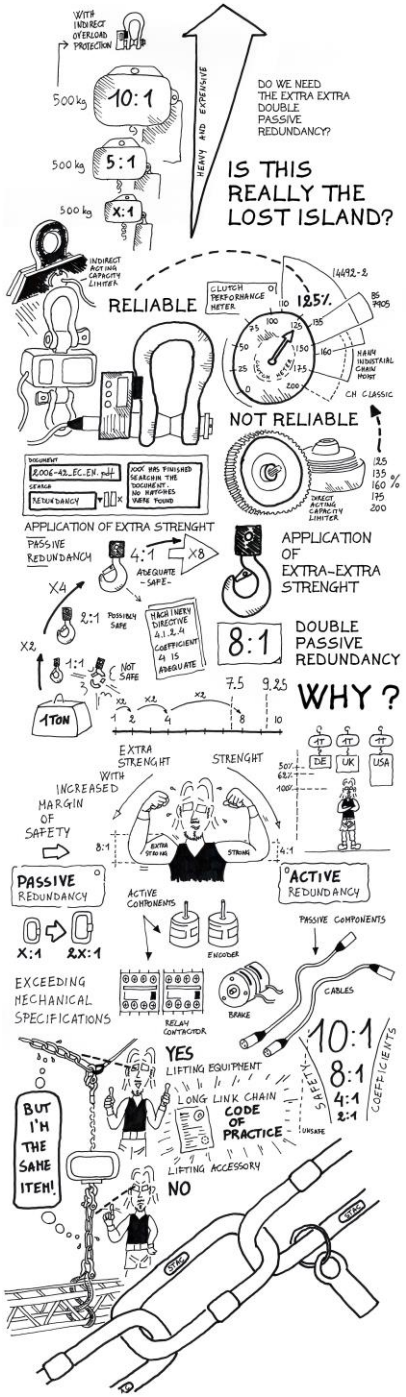
EXTRA

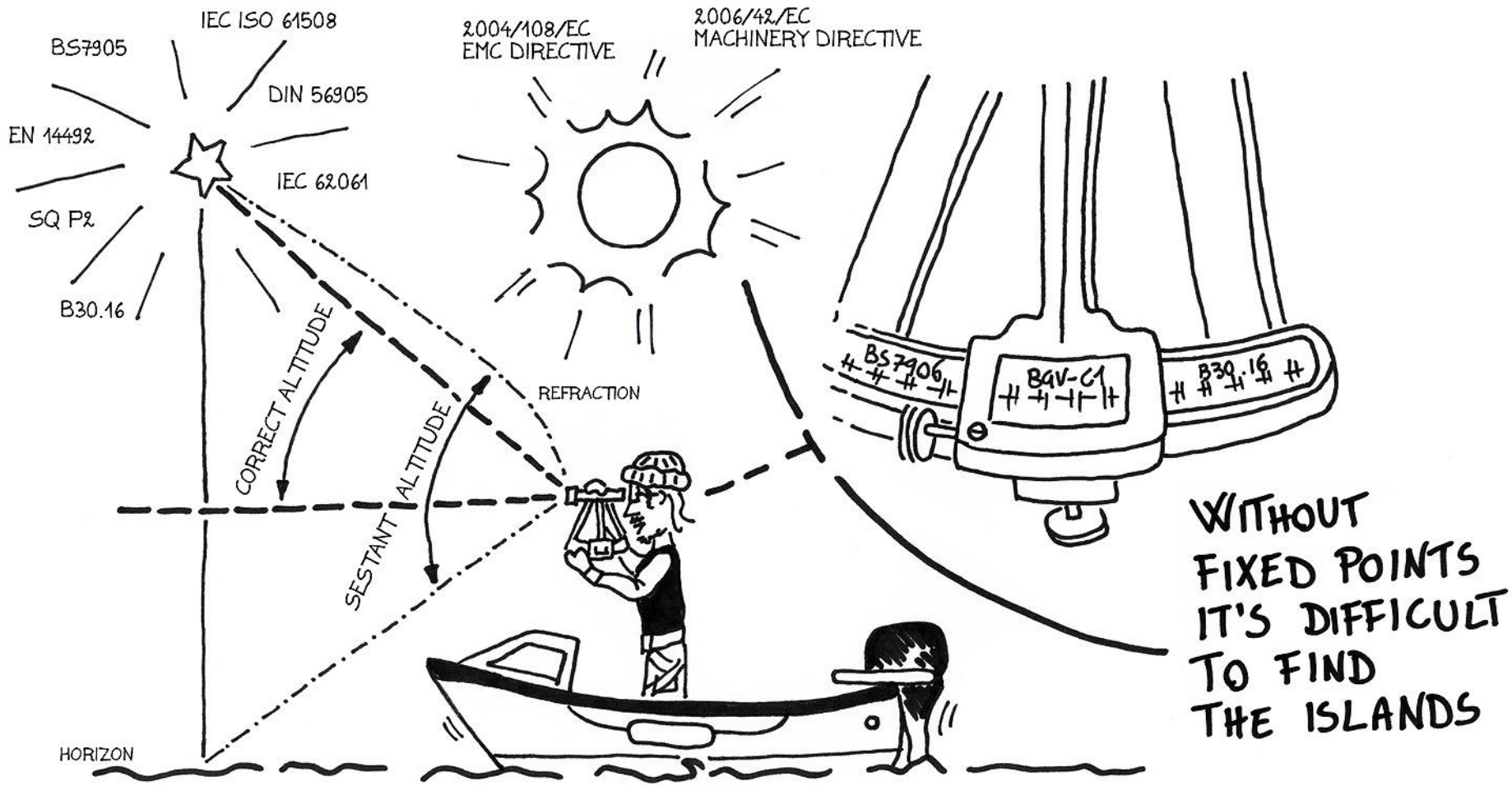

INDIRECT ACTING CAPACITY LIMITER
RELIABLE
CLUTCH PERFORMANCE METER
14492-2
BS 7905
125%
110
75
100
125
135
50
150
160
25
175
0
200
CLUTCH METER
MANY INDUSTRIAL CHAIN HOIST
CM CLASSIC
NOT RELIABLE
DOCUMENT
2006-42_EC_EN.pdf
SEARCH
REDUNDANCY
XXX HAS FINISHED SEARCHIN THE DOCUMENT. NO MATCHES WERE FOUND
DIRECT ACTING CAPACITY LIMITER
125
135
160 %
175
200
APPLICATION OF EXTRA STRENGHT

THE ISLAND CAN'T BE FOUND



THE MYTH OF INACCURACY

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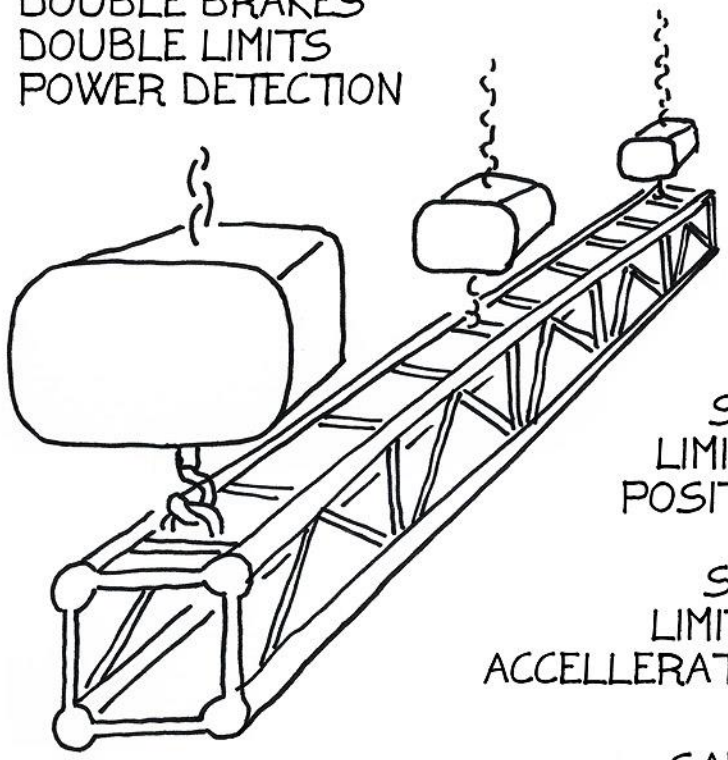
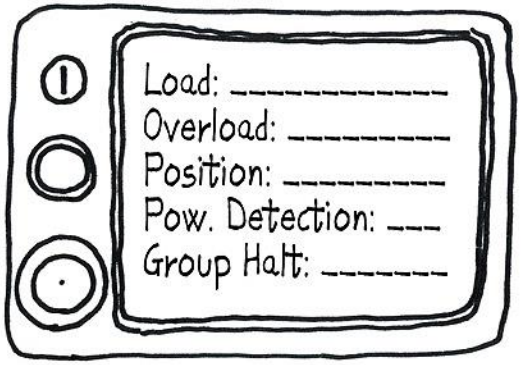
BS7905
DIN 56905
EN 14492
IEC 62061
SQ P2
B30.16
2004/108/EC
EMC DIRECTIVE
2006/42/EC
MACHINERY DIRECTIVE
BS7906
BQV-C1
B30.16
CORRECT ALTITUDE
SESTANT ALTITUDE
REFRACTION
HORIZON
WITHOUT
FIXED POINTS
IT'S DIFFICULT
TO FIND
THE ISLANDS

DOUBLE SAFETY FACTOR
ENCODER - POSITIONING
LOAD MONITORING
DOUBLE BRAKES
DOUBLE LIMITS
POWER DETECTION





MINIMUM SAFETY REQUIREMENTS

ADVANCED SAFETY REQUIREMENTS

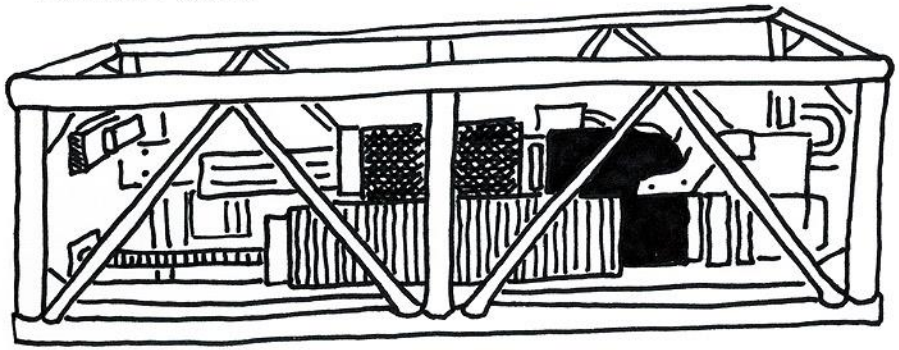
CROSS GROVE DETECTION

SAFE LIMIT SPEED

SAFE EMERGENCY LIMITS

SAFE LIMITED POSITION

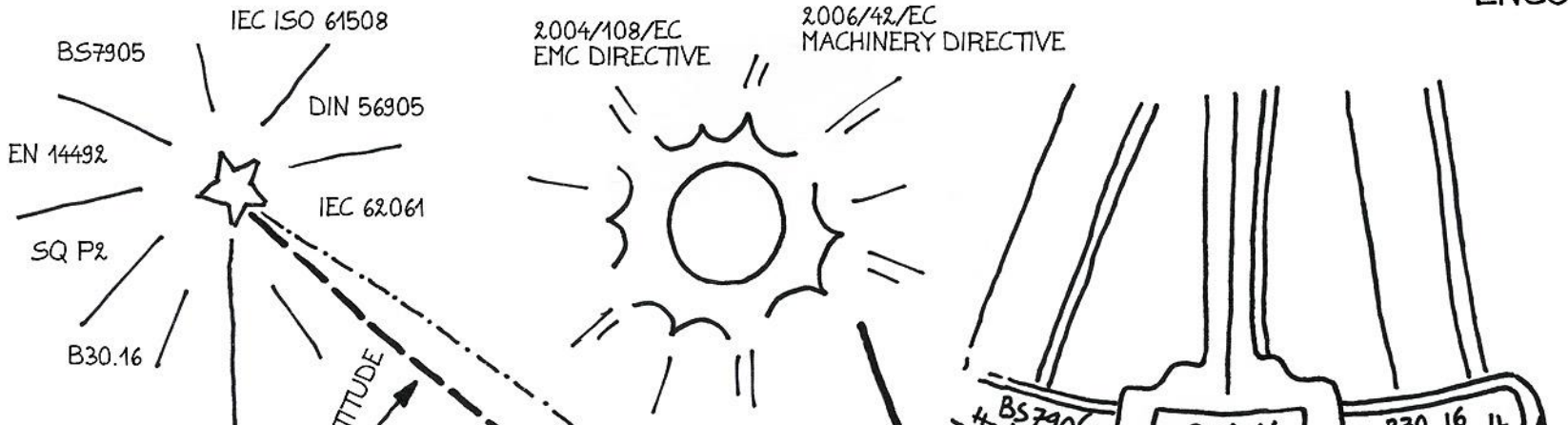
SAFE LIMITED ACCELLERATION



SAFE DIRECTION

DUAL BRAKES

DOUBLE ENCODER

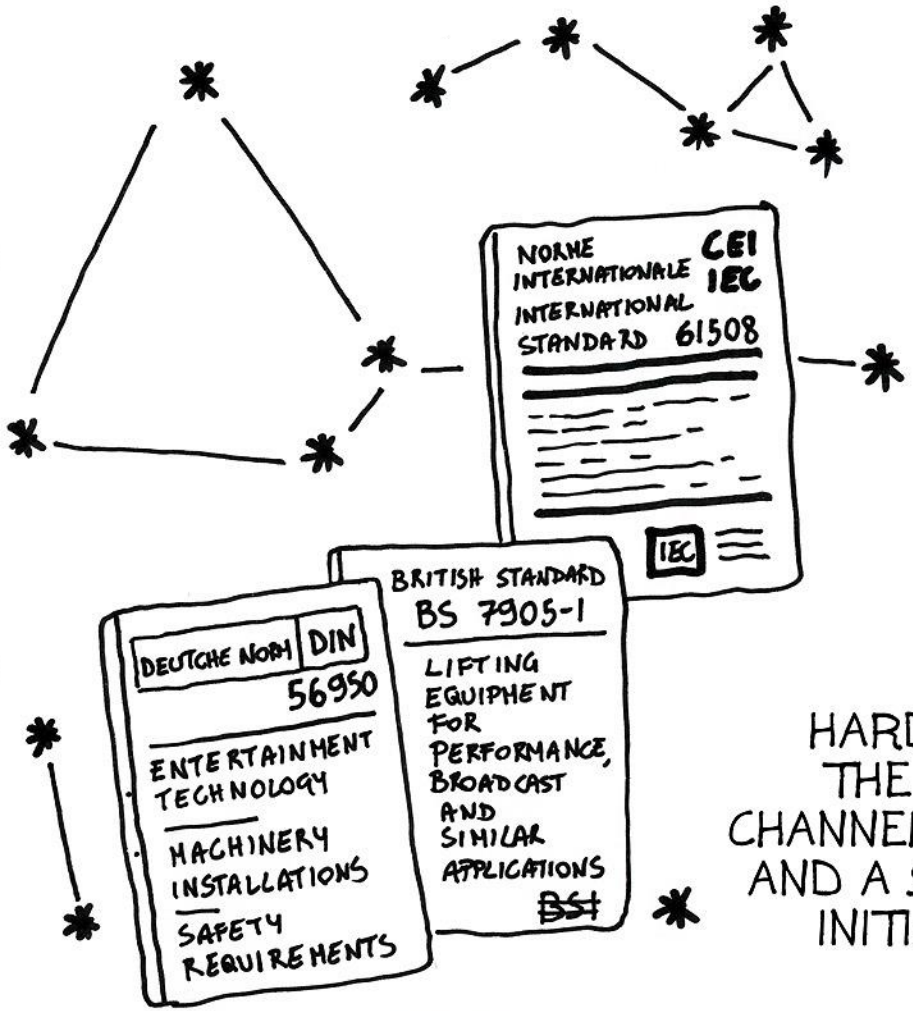


DIN 56950:2012

CHAPTER 7.2.2
"BY PROVIDING PARTIAL OR COMPLETE REDUNDANCY, IT'S POSSIBLE TO MINIMIZE THAT A SINGLE FAULT CAN RESULT ON A HAZARDOUS CONDITION".

IEC 61508-7:2000

CHAPTER A.2.5
"MONITORED REDUNDANCY. TO DETECT FAILURE, BY PROVIDING SEVERAL FUNCTIONAL UNITS, BY MONITORING THE BAHAVIOUR OF EACH OF THESE DETECTED FAILURES, AND BY INITIATING A TRANSITION TO A SAFE CONDITION IF ANY DISCREPANCY IN BEHAVIOUR IS DETECTED

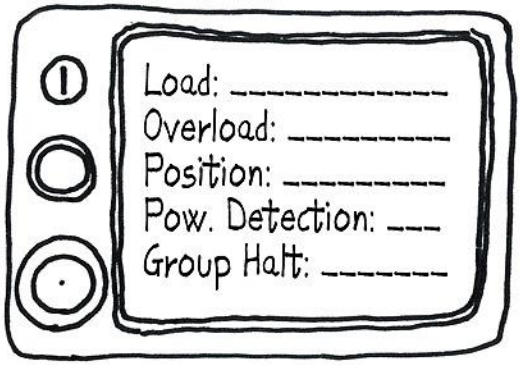


BS 7906:1-2005

CHAPTER 8.19.1
"HOIST DESIGNED FOR USE IN THE ENTERTAINMENT INDUSTRY INCORPORATE SAFETY FEATURES, SENSORS AND IN-BUILT REDUNDANCY".

THE SAFETY FUNCTION IS EXECUTED BY AT LEAST TWO HARDWARE CHANNELS. THE OUTPUT OF THESE CHANNELS ARE MONITORED AND A SAFE CONDITION IS INITIATED IF A FAULT IS DETECTED

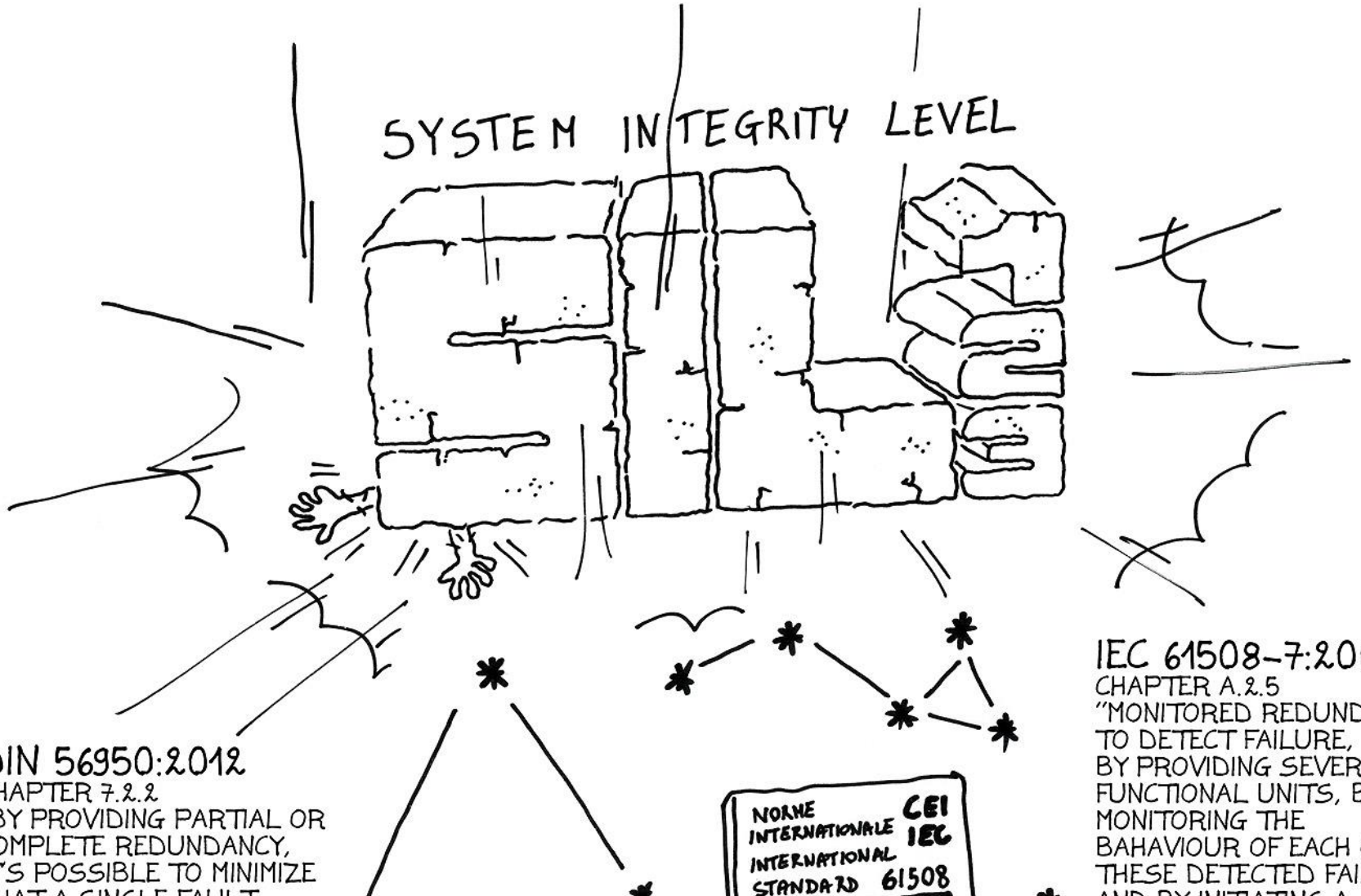
DOUBLE SAFETY FACTOR
ENCODER - POSITIONING
LOAD MONITORING
DOUBLE BRAKES
DOUBLE LIMITS
POWER DETECTION



MINIMUM SAFETY REQUIREMENTS

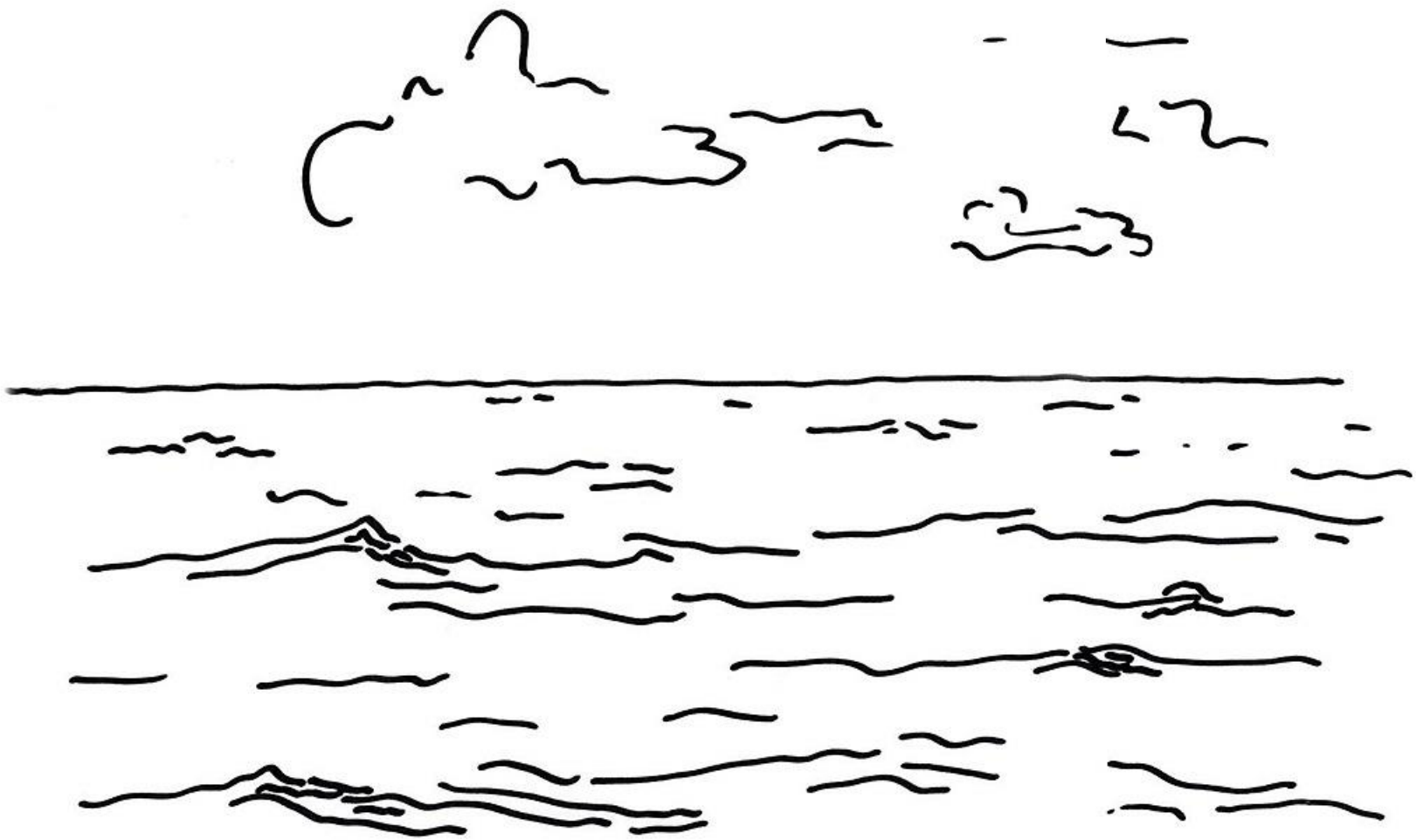
ADVANCED SAFETY REQUIREMENTS

A SIL IS DETERMINED BASED ON A NUMBER OF QUANTITATIVE FACTORS IN COMBINATION WITH QUALITATIVE FACTORS SUCH AS DEVELOPMENT PROCESS AND SAFETY LIFE CYCLE MANAGEMENT.



DIN 56950:2012
CHAPTER 7.2.2
"BY PROVIDING PARTIAL OR COMPLETE REDUNDANCY, IT'S POSSIBLE TO MINIMIZE

IEC 61508-7:2000
CHAPTER A.2.5
"MONITORED REDUNDANCY. TO DETECT FAILURE, BY PROVIDING SEVERAL FUNCTIONAL UNITS, BY MONITORING THE BAHAVIOUR OF EACH OF THESE DETECTED FAILURES,

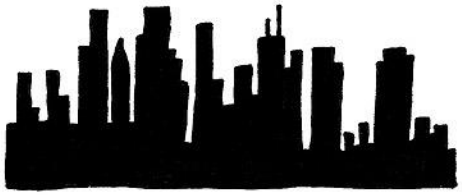


41°

PARALLEL
NORTH

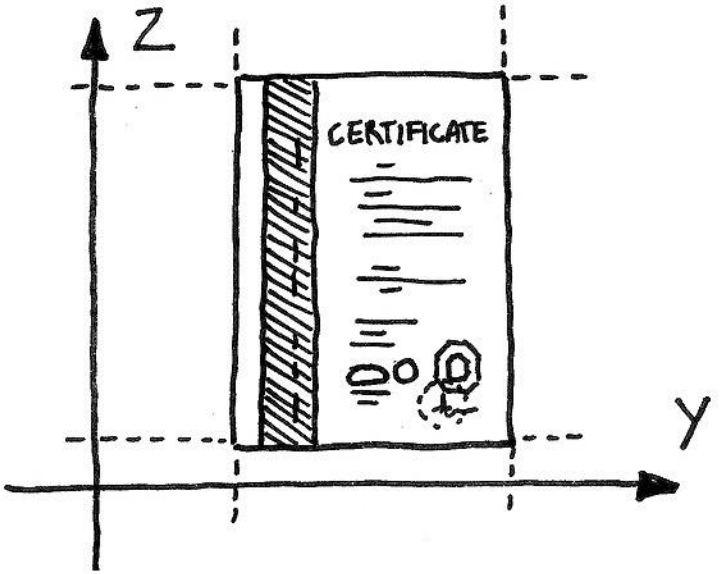
NEW YORK

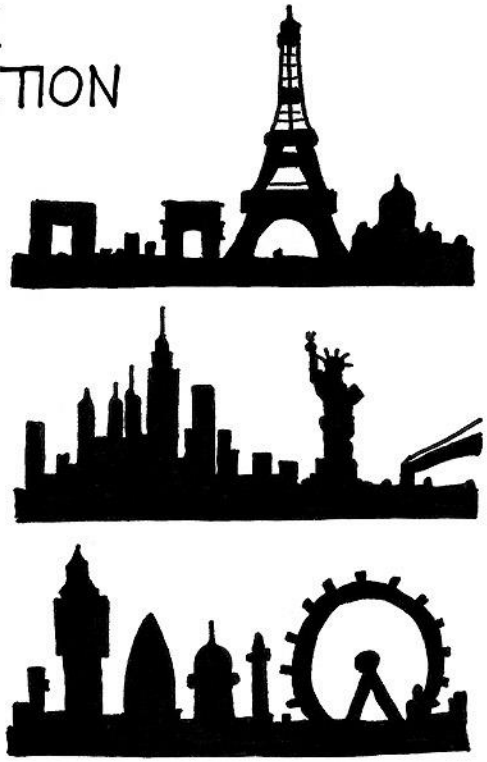
NAPLES

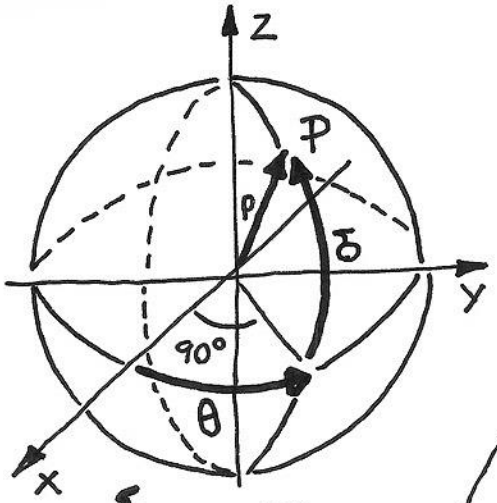


MELBOURNE OR CHICAGO?

CERTIFICATIONS ARE ONLY THE SAFETY SKYLINE OF A MACHINERY INSTALLATION



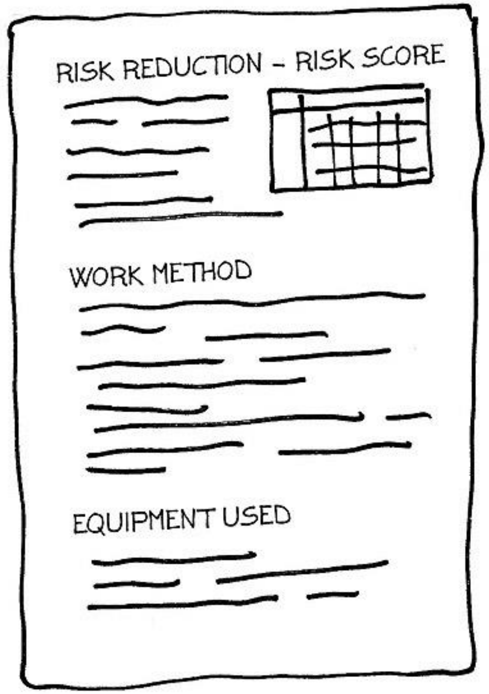




δ LATITUDE

41°

41° PARALLEL NORTH



SCENIC MOVEMENTS **SIL** LEVEL ASSESSMENT

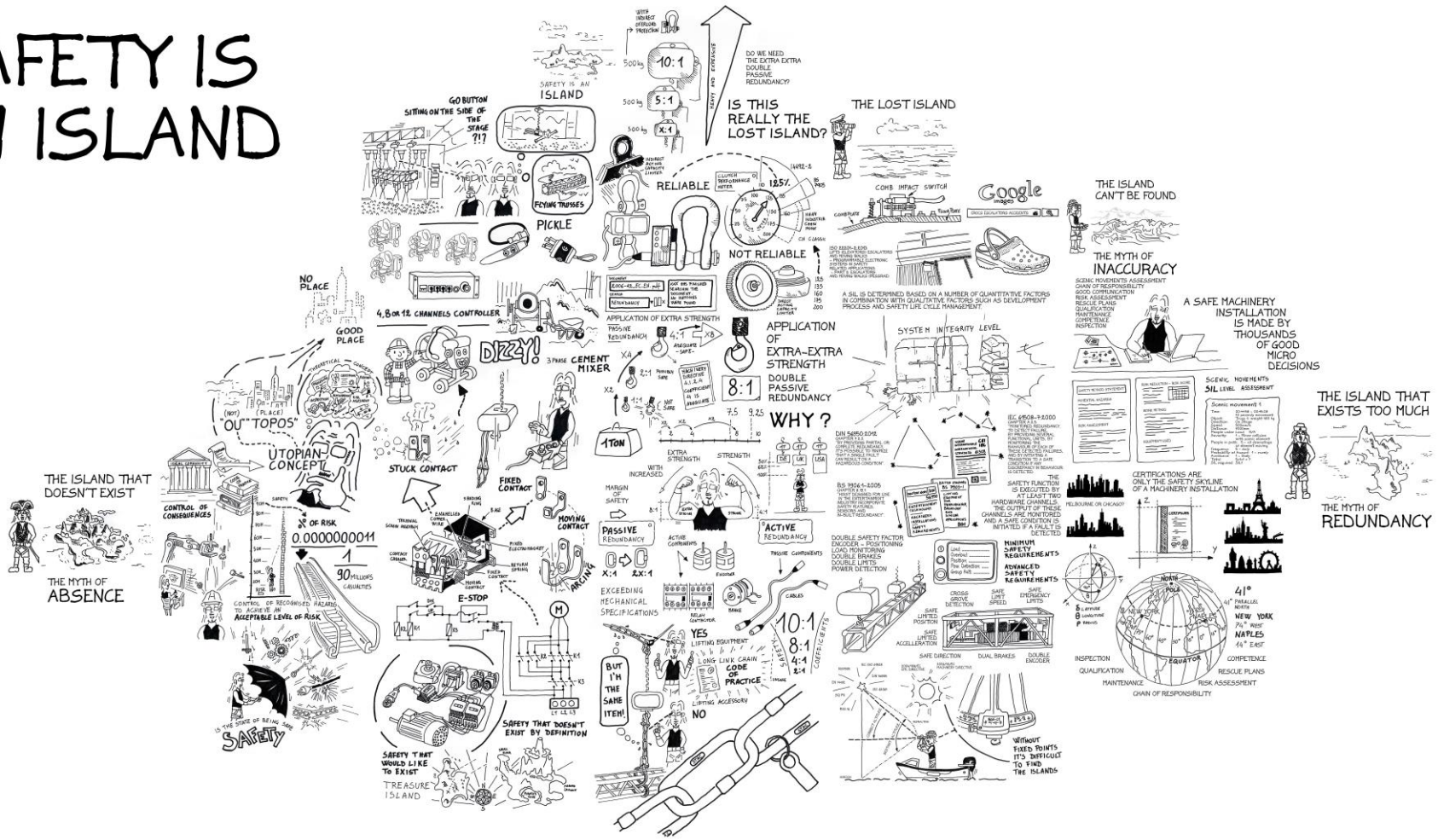
Scenic movement 1

Time: 00:44:58 – 00:45:08
10 seconds movement
Object: Truss 4; weight 480 kg
Direction: On Stage
Speed: 500mm/s
Distance: 7000mm
People under Load: N/A
Severity: 1 – Minor collision with scenic element
People in path: 5 – all downstage of element moving
Frequency: 5 – daily
Probability of Hazard: 1 – rarely
Avoidance: 1 – likely
Total: 5+1+1 = 7
SIL required: SIL1

CERTIFICATIONS ARE ONLY THE SAFETY SKYLINE OF A MACHINERY INSTALLATION

MELBOURNE OR CHICAGO?

SAFETY IS AN ISLAND



BLUMANO