

How to display quantitative risks

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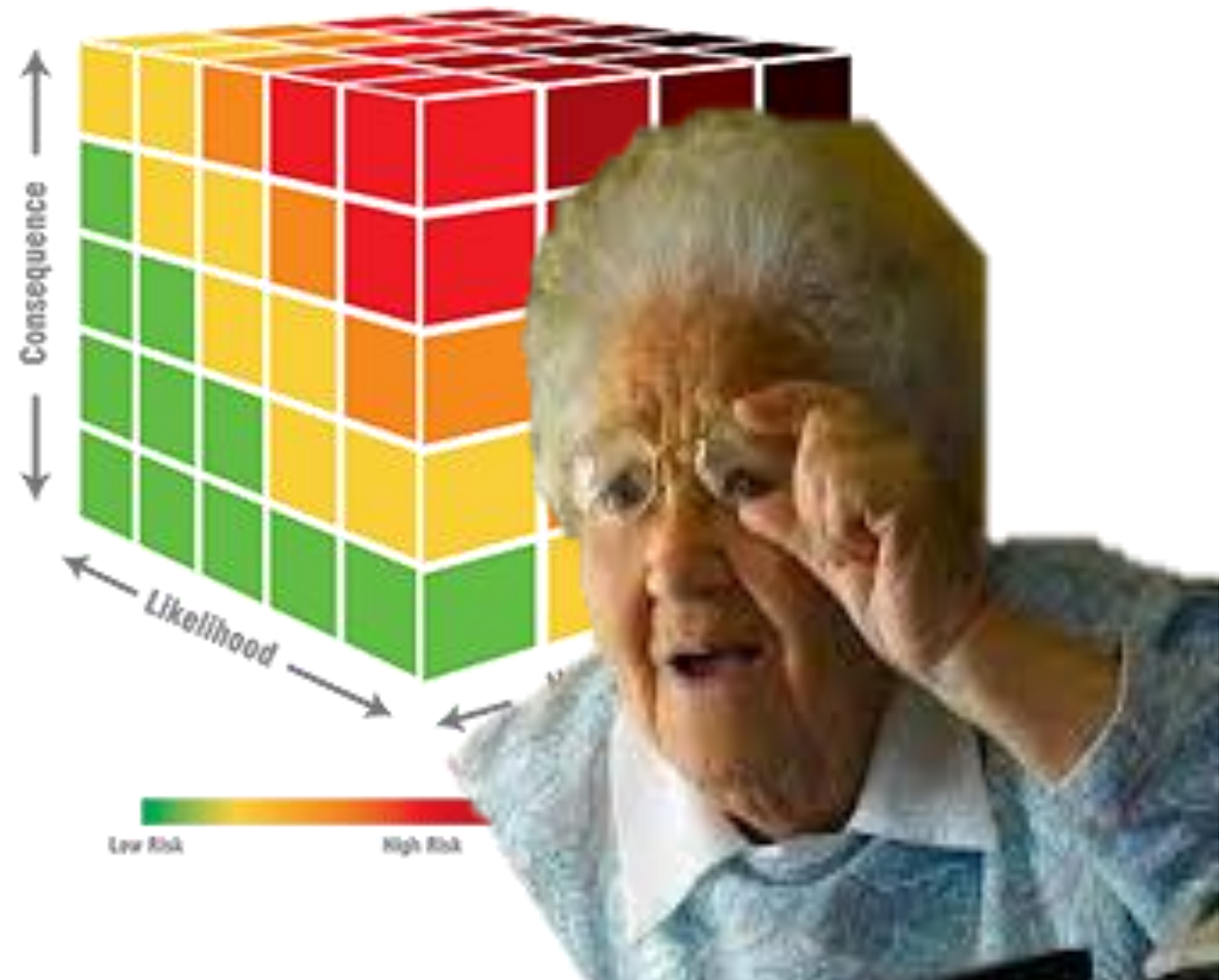
RISK
AWARENESS
WEEK²⁰²²



Communicating to stakeholders

Better present your risk analysis

- Show alternatives to decision-makers
- Ineffective registers and periodic reports
- Limited graphical representations
- Actionable graphs denotes good analysis
- Efficient use of the assessment time
- Visual comparison of alternatives
- Facilitate discussions to assess actions

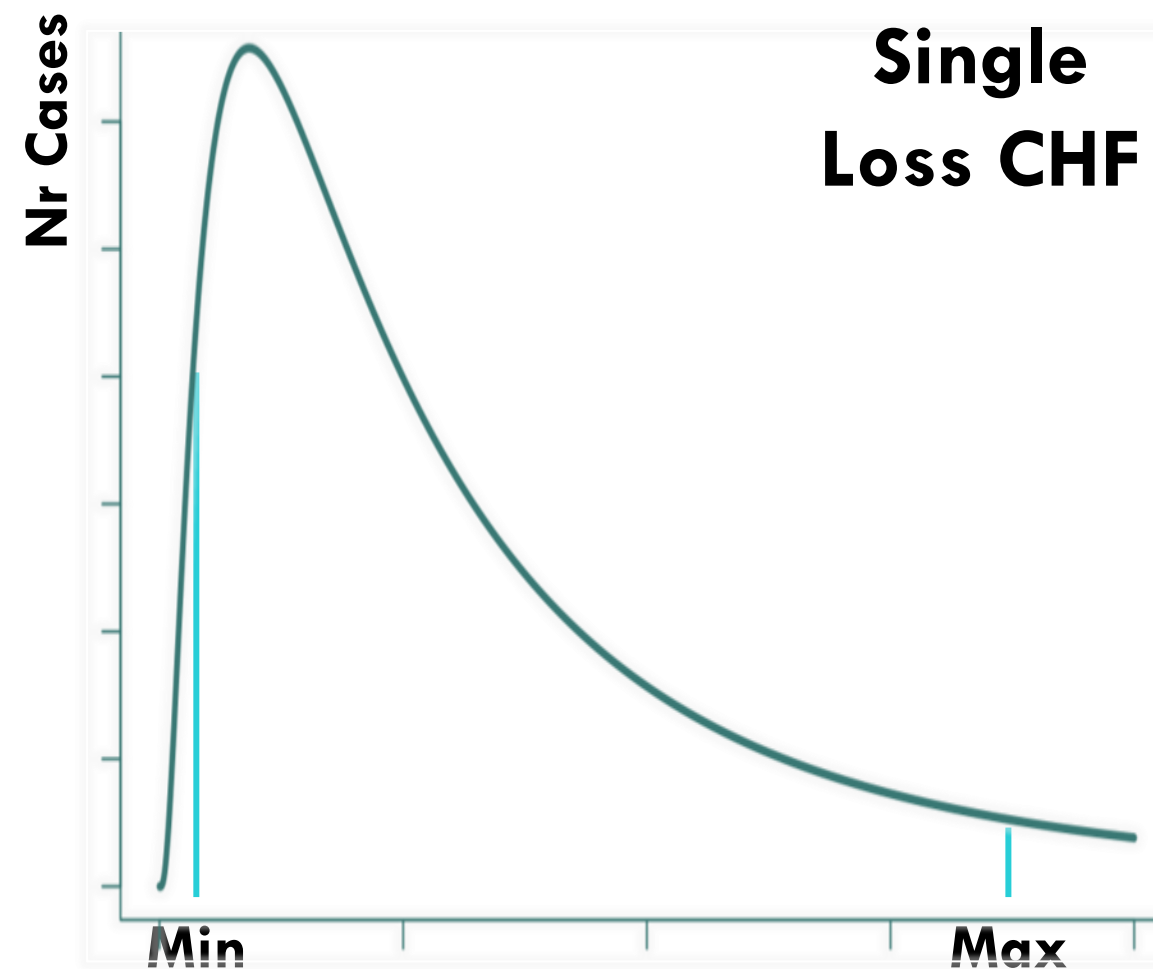


LOOK AT ALL THESE RISK REPORTS



I DON'T UNDERSTAND

Workshop case > Quantitative model



Single Loss CHF

$$= Ln \left(P(A), \mu = \frac{\ln(\text{Max}) + \ln(\text{Min})}{2}, \sigma = \frac{\ln(\text{Max}) - \ln(\text{Min})}{\text{Standard Error}} \right)$$



=LOGNORM.INV(RAND(),(LN(Max)+LN(Min))/2,(LN(Max)-LN(Min))/Standard Error))

Loss CHF

Confidence Interval

	Confidence Interval	Standard Error
z*-value*2	80%	2.56
	90%	3.29
	95%	3.92
	99%	5.15

Demo > Identification

#	Update	Domain	Area	Objective	Manager	Risk factor	Threat vector	Main asset at risk	Agent	Emerging
1	Oct/22	IT and cyber security	NAFTA	Maintain mainframe availability 99.5%	Chief information security officer	Outdated and incomplete incidence response plan	Negligence - Lack of procedures and monitoring	Mainframe	External - Cyber criminals	No
2	Oct/22	IT and cyber security	NAFTA	Maintain mainframe availability and integrity at 99.5%	Chief information security officer	Unmanaged incompatibilities between mainframe software and hardware during patching	Accidental - Software failure	Mainframe	Internal - Employees	No

Illustrative examples for the workshop

Demo > Assessment model

Consequence	Min Loss	Max Loss	Confidence	Main control	Secondary control	Efficiency	Min Annual Prob	Max Annual Prob	Confidence	
Productivity losses Best scenario: 1 hour, 100 affected users Worst scenario: 4 hours, 200 affected users	25,000 CHF	200,000 CHF	99% 1	IT Continuity plans	#	Control name	50%	21%	43%	95%
Productivity and data losses Best scenario: 1 hour, 100 affected users, 500 order datasets lost Worst scenario: 2 hours, 200 affected users, 1500 order datasets lost	100,000 CHF	250,000 CHF	95% #	Control name	#	Control name	0%	7%	15%	90%

250 CHF per hr. lost per user
150 CHF per recovered record

Demo > Native Monte Carlo Simulations

1	2	3	4	5	6	7	8	9	10
14,552 CHF	19,738 CHF	12,891 CHF	49,618 CHF	10,146 CHF	45,709 CHF	34,677 CHF	20,752 CHF	25,538 CHF	22,429 CHF
16,018 CHF	27,411 CHF	12,479 CHF	13,100 CHF	18,383 CHF	16,286 CHF	27,099 CHF	11,031 CHF	25,246 CHF	11,863 CHF



Simulated loss per interaction

Demo > Annual reserves for a % of coverage

10%	20%	30%	40%	50%	60%	70%	80%	90%
12,067 CHF	14,859 CHF	17,002 CHF	19,108 CHF	21,208 CHF	23,807 CHF	26,936 CHF	31,246 CHF	37,597 CHF
10,656 CHF	12,340 CHF	13,646 CHF	14,972 CHF	16,288 CHF	17,718 CHF	19,361 CHF	21,312 CHF	24,426 CHF

Demo > Decision-making

Reportable to Committee	Strategy	Mitigation plan decision	Due dates	Last update
Yes	Treat	1. Update incident protocol for mainframe	Dic 31 2022	
Yes	Treat	1 Hire specialized technical consultant to identify and fix incompatibilities	Dic 31 2022	

**WHEN YOU GET
TEMPLATES**



YOUR RISK

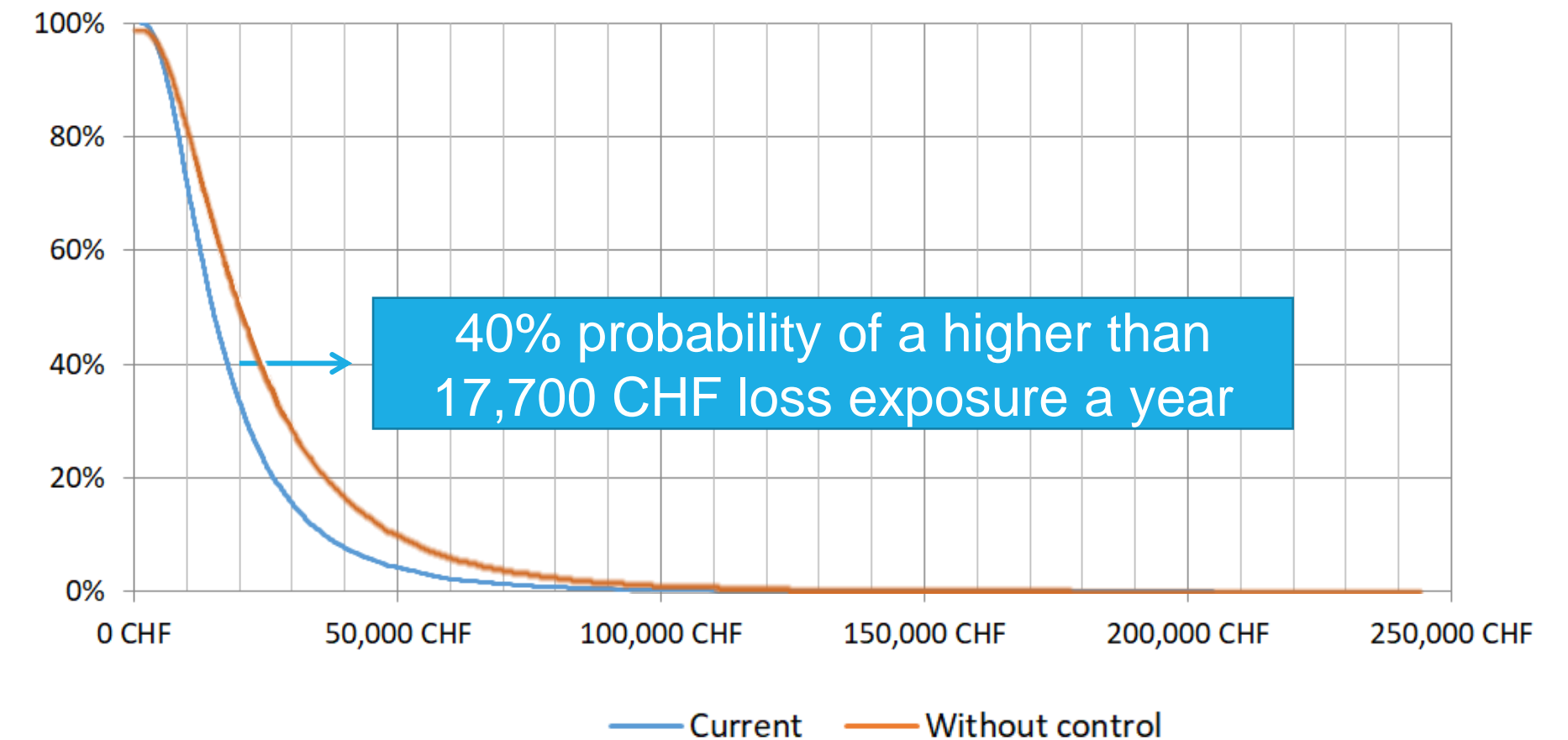
**YOUR MONTE
CARLO
SIMULATIONS**



Loss exceedance curve

- Probability of exceeding an expected loss, usually per year
- X-axis > accumulative annualized loss exposure for a given scenario
- Y-axis > 0 to 100% probability of a loss being greater than the intersection with the x-axis
- Interpretation *“If risk occurs, there is a 1-99% probability that losses will exceed CHF X. Are you comfortable with a loss greater than CHF X?”*
- Determine appetite or breakeven
- Set reserves
- Calculate savings in treating risks

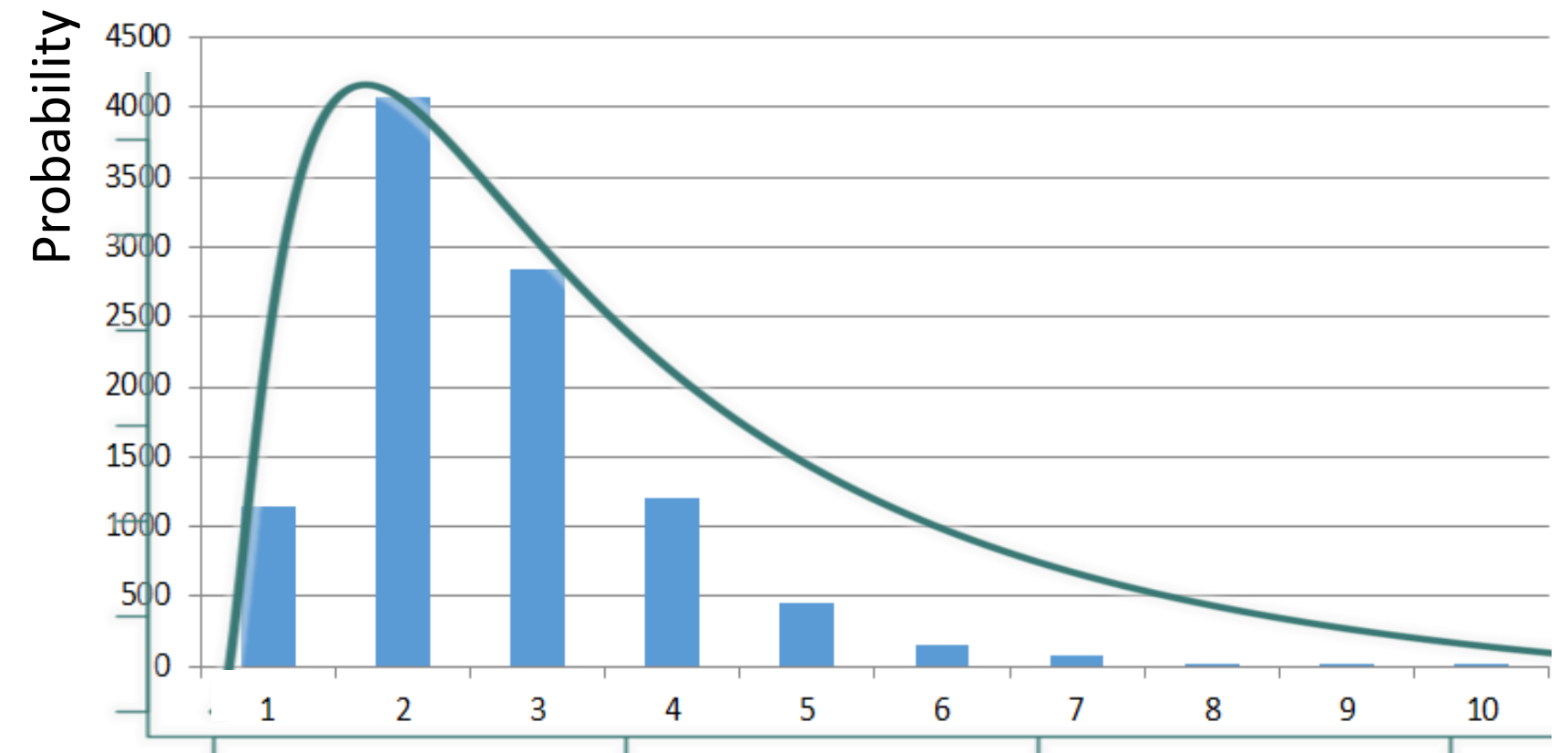
Workshop case > Expected annual losses due to defects on the incidence response plan before and after a general business continuity plan



Histogram

- Density of expected losses across intervals
- X-axis > ranges of outputs
- Y-axis > probability of outputs within the intervals with the x-axis
- Interpretation *“There are 1-99% changes to exceed the target budget of X CHF”*
- Present the output of simulations
- Compare against a budget
- Identify the type of distribution
- Identify the best treatment alternative

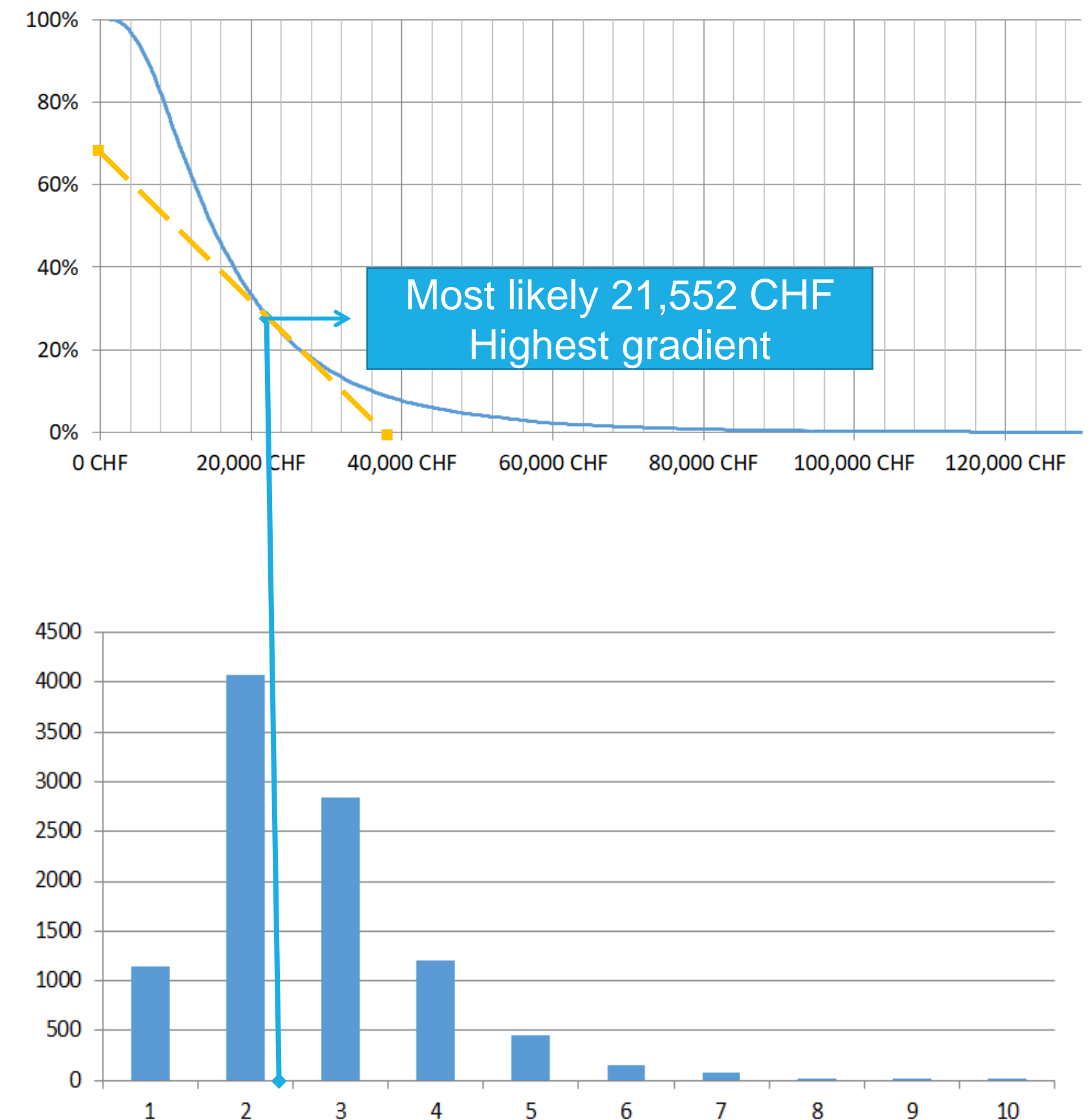
Workshop case > Outdated and incomplete incidence response plan for the mainframe



Bin	ALE	Acum	Frequency
	4,692 CHF	0	0
1	16,091 CHF	2,626	2626
2	27,490 CHF	7,112	4486
3	38,890 CHF	9,110	1998
4	50,289 CHF	9,738	628
5	61,688 CHF	9,922	184
6	73,087 CHF	9,976	54
7	84,486 CHF	9,992	16
8	95,886 CHF	9,995	3
9	107,285 CHF	9,997	2
10	118,684 CHF	9,999	1
	130,083 CHF	10,000	0

Histogram and loss exceedance curve

- The probability of losses can be accumulated
- Histograms better display distributions
- *Distribution types such as lognormal or PERT are hard to be visualized in exceedance curves*
- Accumulated curves better display abnormalities
- *The width of the bars can hide abnormalities in histograms*





**HISTOGRAM
TAIL**

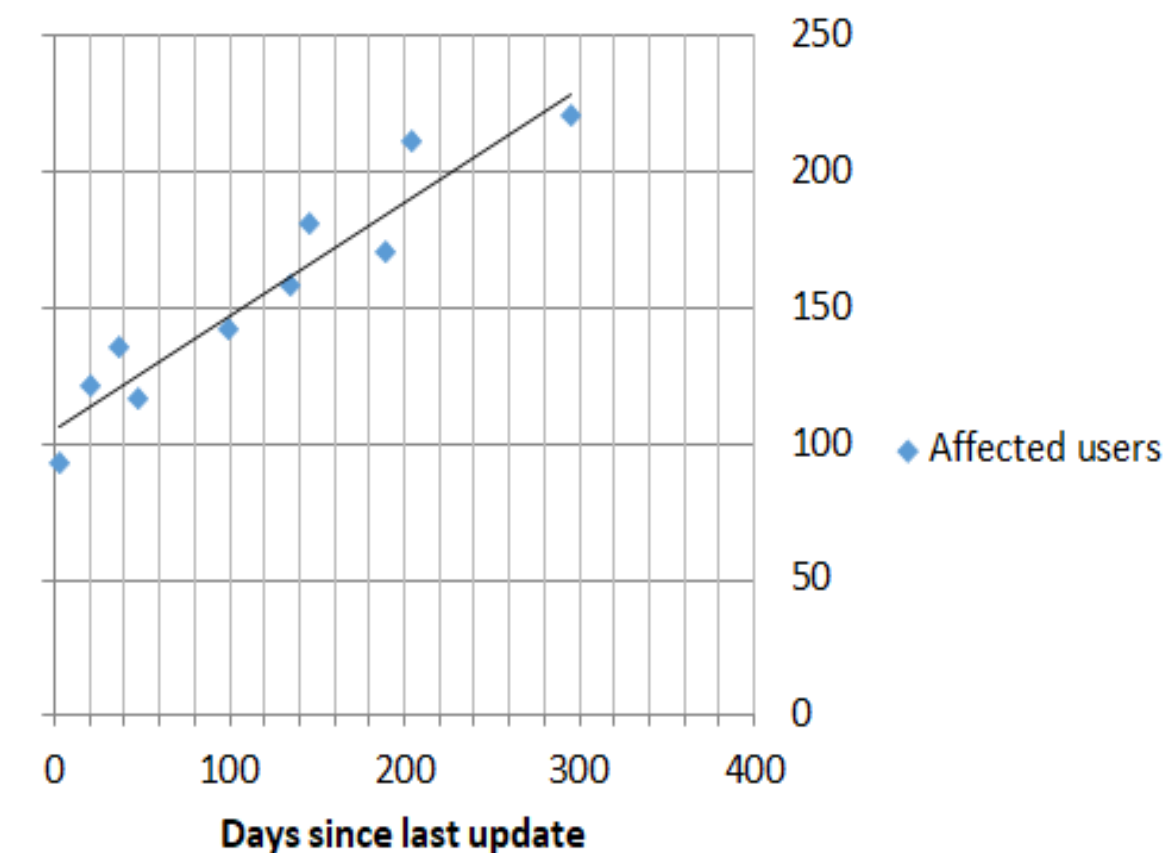
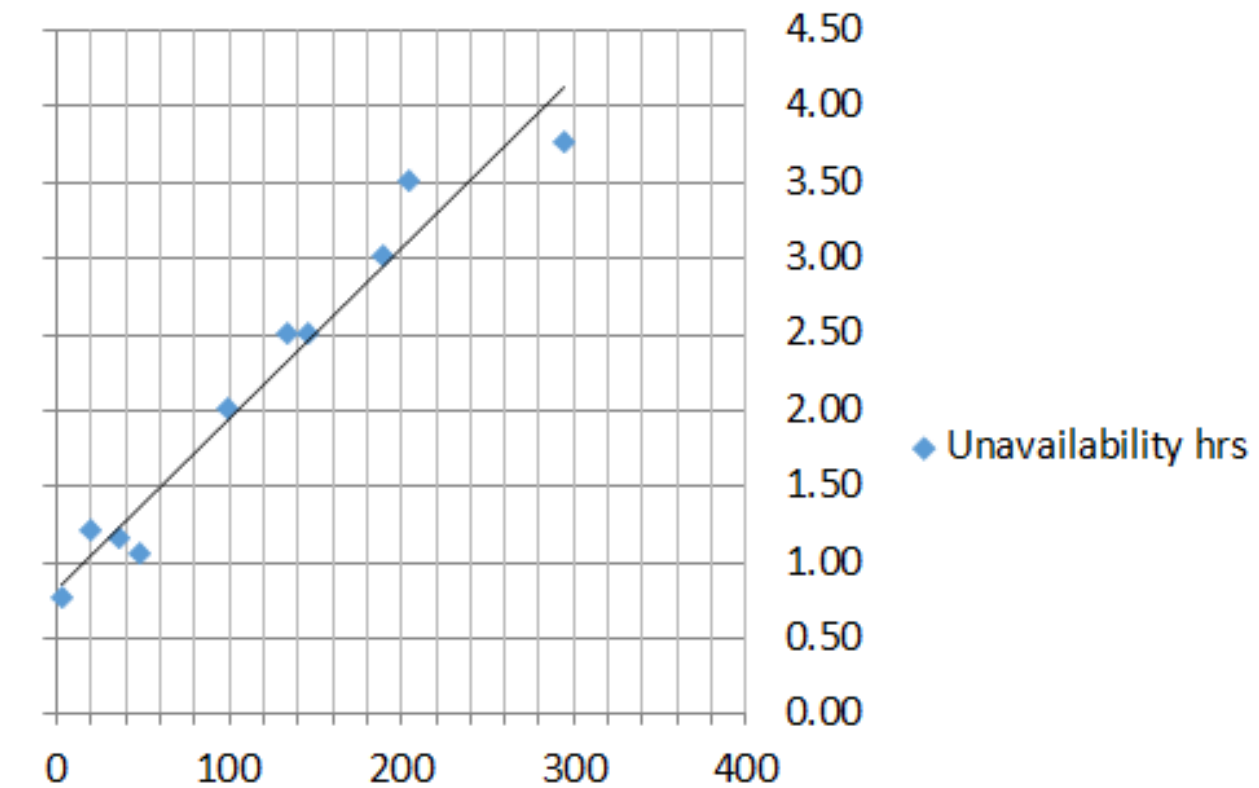
MANAGERS

**ALL OTHER
OUTCOMES**

Regression graph

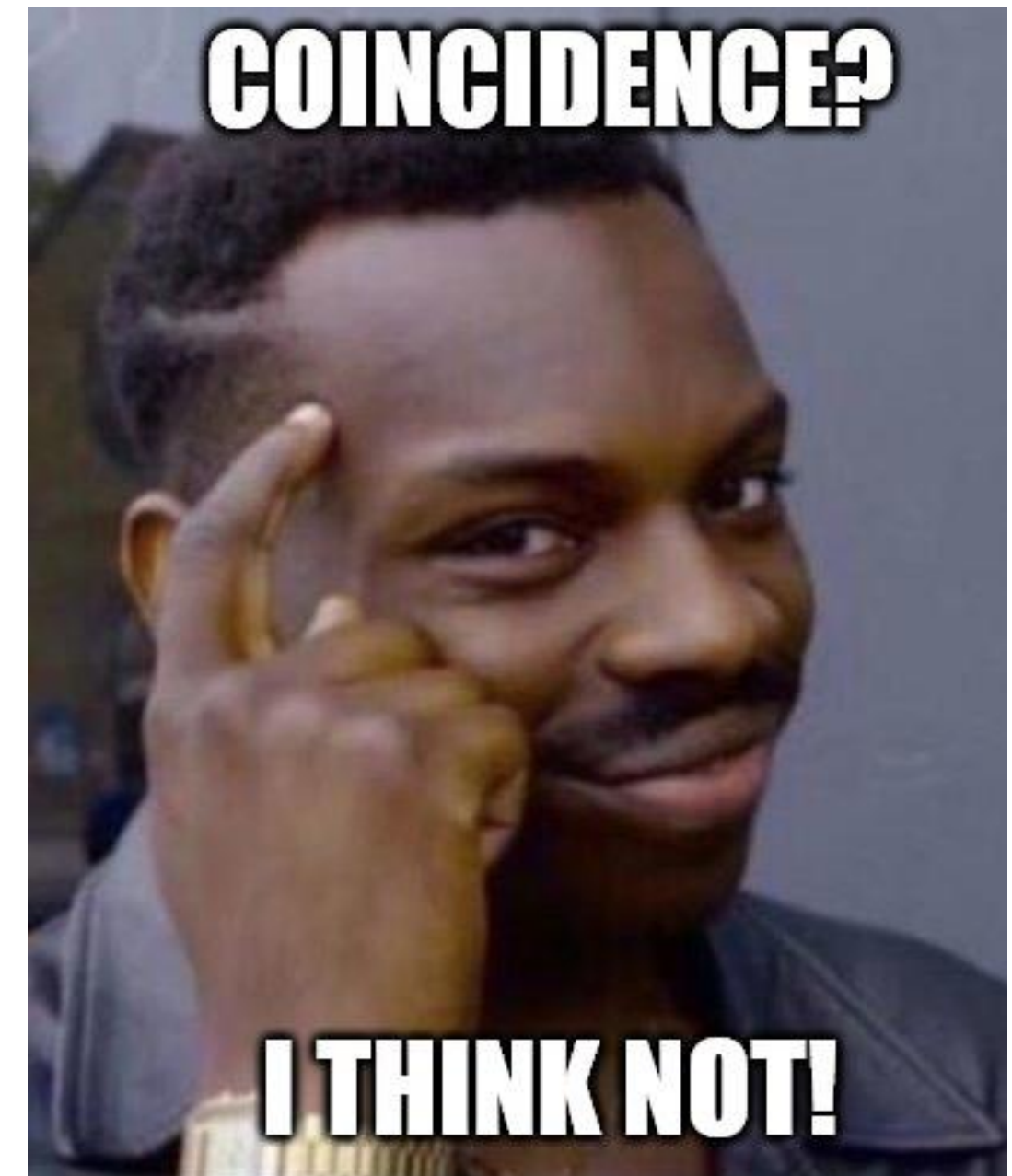
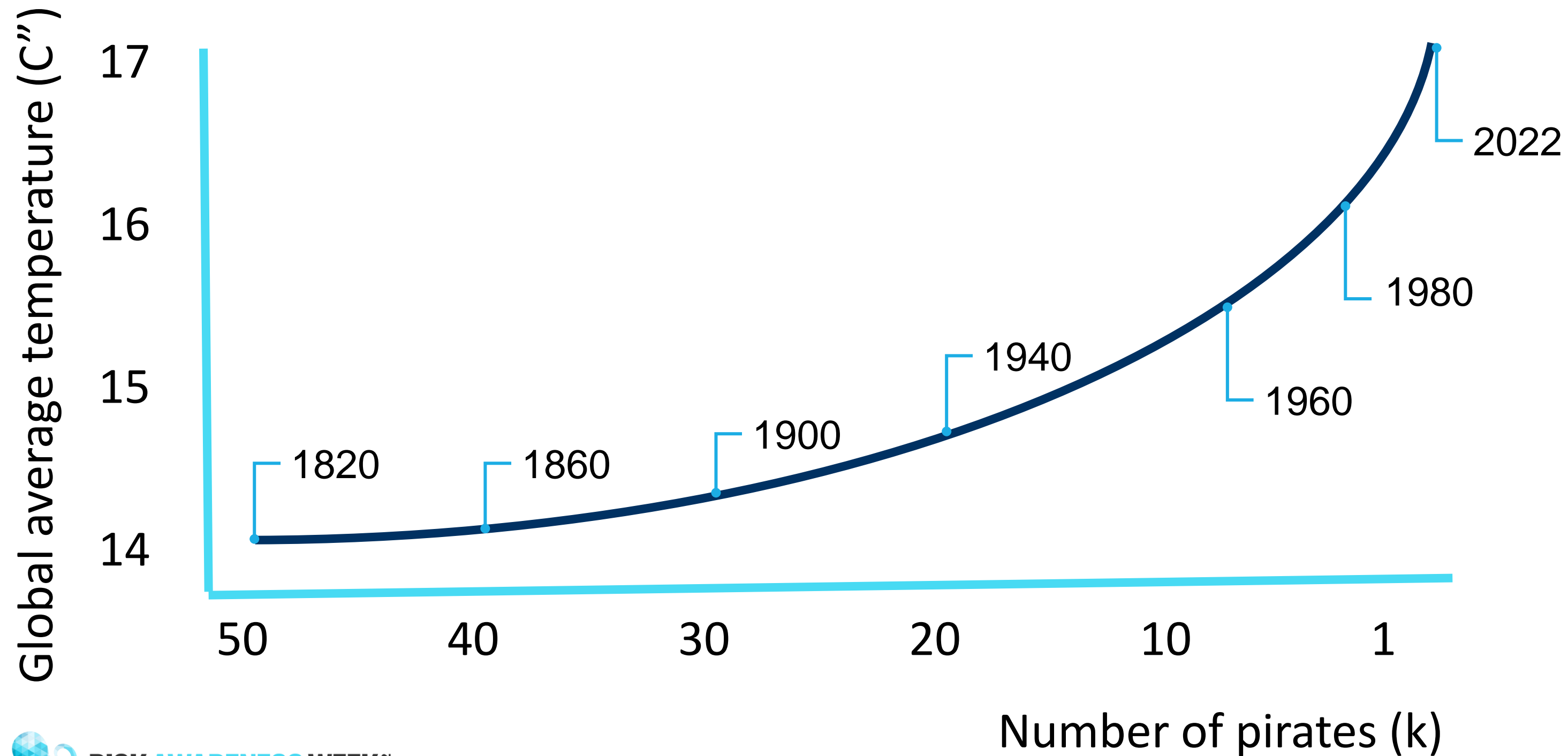
- Predict one dependent factor based on its relationship with one or more other independent factors (scatter plot)
- X-axis > outcome as events, losses or incidents
- Y-axis > factor(s) or time
- Interpretation “*The relationship between factors to incidents is strong since the points hug*”
- Confirm a suspected factor
- Predict trends in outcomes
- Link treatment investments to risk savings

Workshop case > Outdated and incomplete incidence response plan for the mainframe



Regression graph

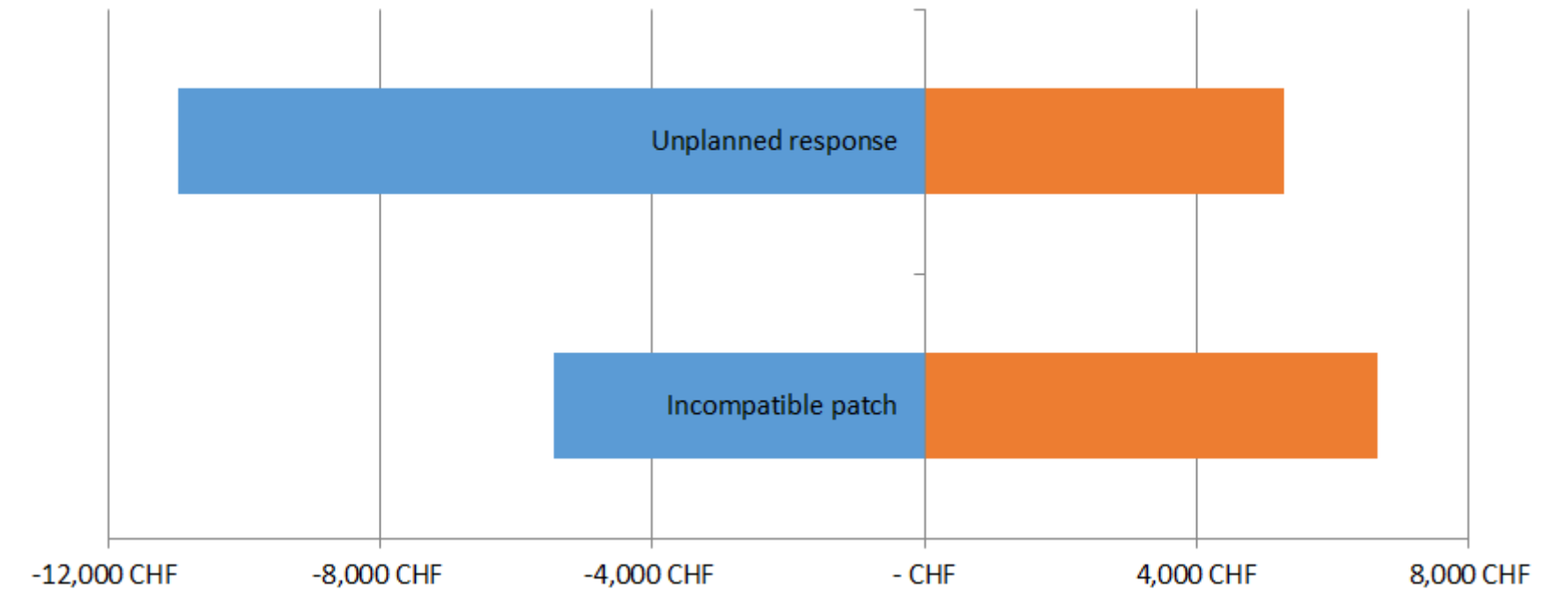
- The diminishing number of pirates caused global warming risks



Tornado chart

- Compare the relative sensitivity to risk factors
- X-axis > deviation from the objective in money or time
- Y-axis > descendent list of factors indicating variables and uncertainties
- Interpretation *“The main factors contributing to the variability of the objective are...”*
- Define what factors has the highest impact objectives
- Focus actions to key factors
- Define key factors to monitor

Workshop case > Deviation from a 20,000 CHF annual budget for the assessed risks

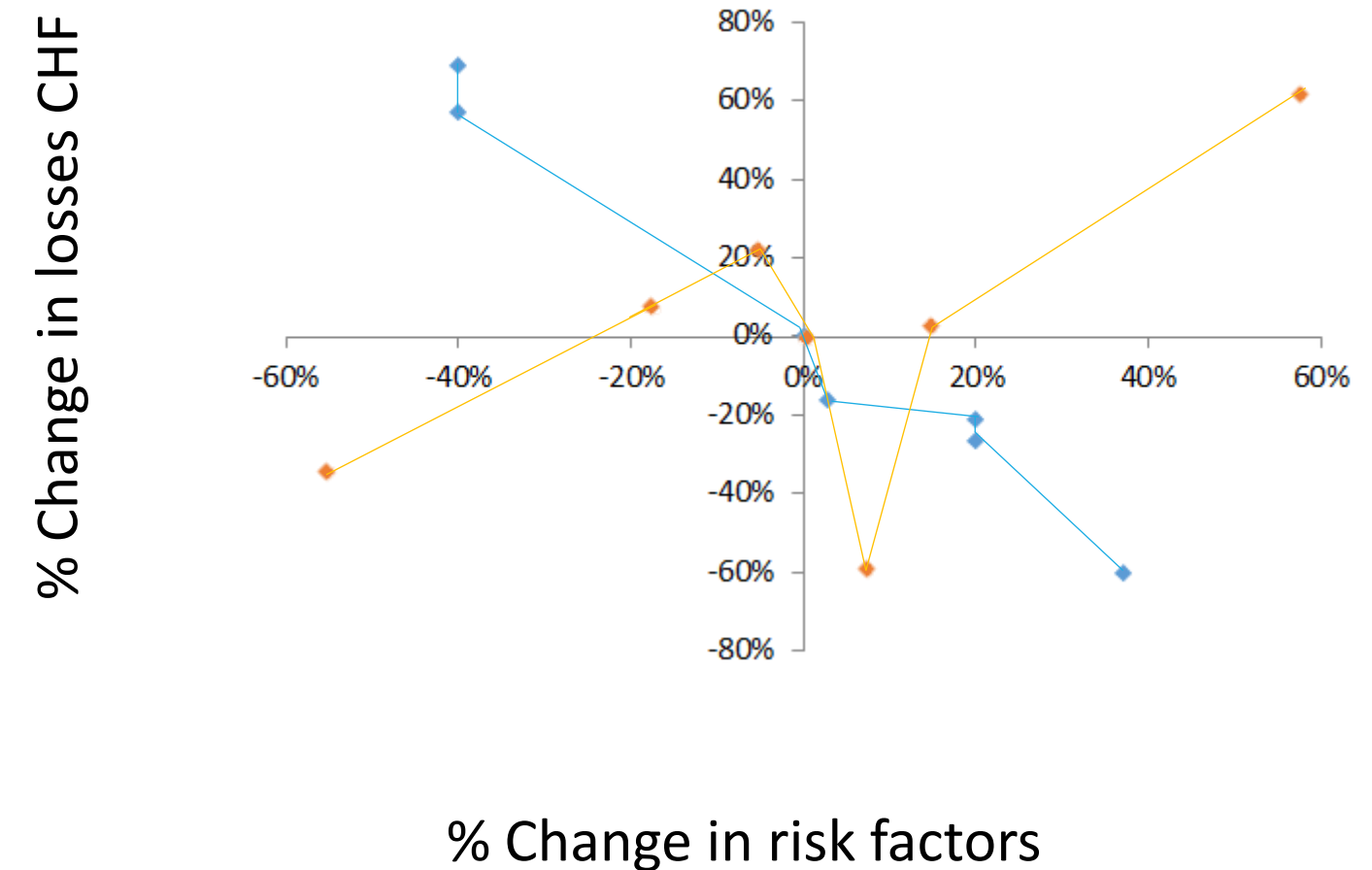


Risk	Budget annual	Lowest 20%	Highest 20%	Dev Low	Dev Max
Incompatible patch	20,000 CHF	14,841 CHF	30,868 CHF	- 10,868 CHF	5,159 CHF
Unplanned response	20,000 CHF	13,510 CHF	25,676 CHF	- 5,676 CHF	6,490 CHF

Spider chart

- Compare the relative sensitivity to risk factors
- X-axis > deviation from the objective in money or time
- Y-axis > descendent list of factors indicating variables and uncertainties
- Interpretation “*Any change in the factor A affects the most the target objective*”
- Asses the impact of risk on a target return of a project
- Calculate the effect on a project of changing one of its risk factors

Workshop case > Sensitivity to cyber risks

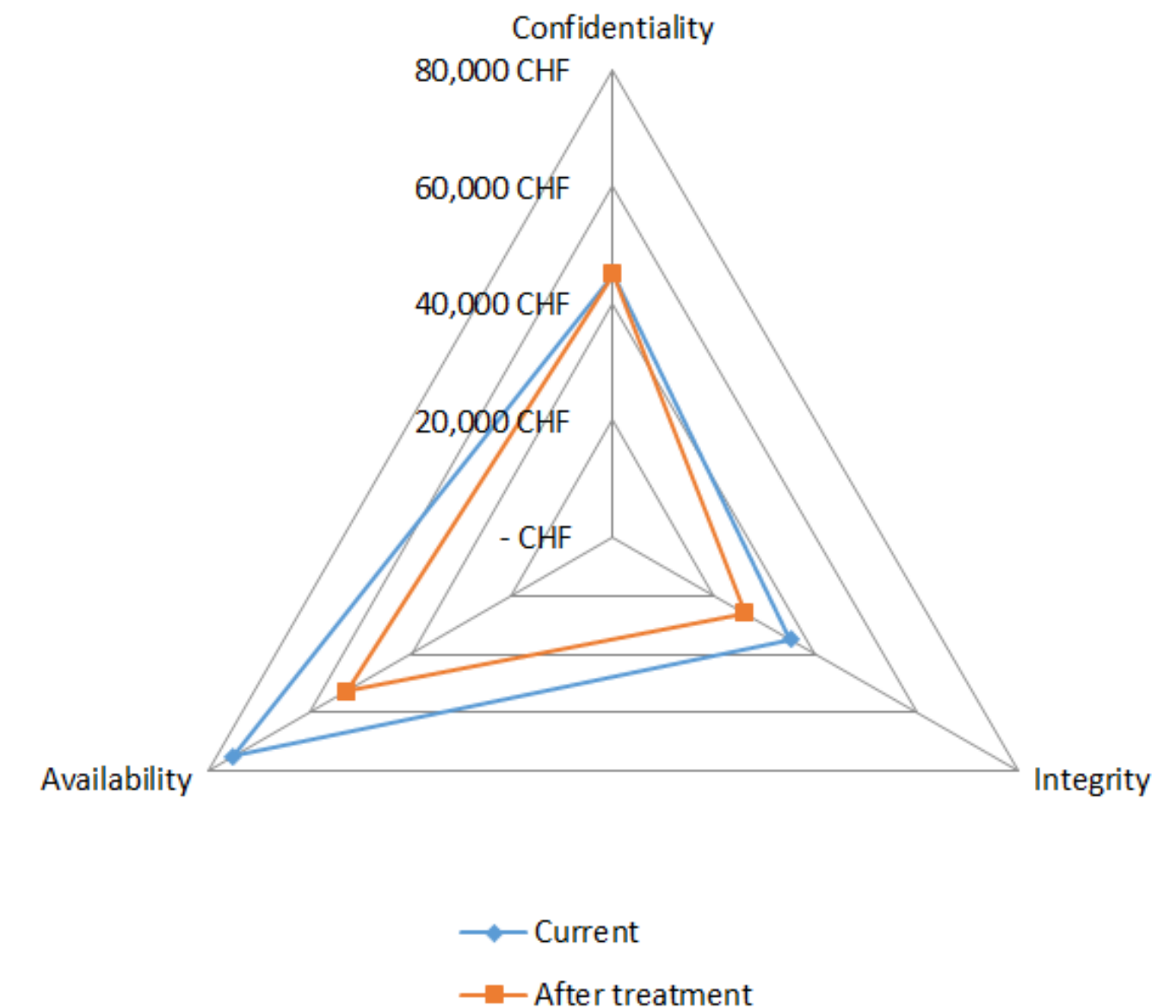


- ◆ Tested updated protocols
- Completed patch updates

Radar chart

- Compare risk exposures in connection to particular objectives
- Radial axis > objectives
- Circular axis > cumulative risk exposure to an objective
- Interpretation “*Option A compromise more the objective 1 than option B*”
- Assess alternatives over/under a tolerance per objective

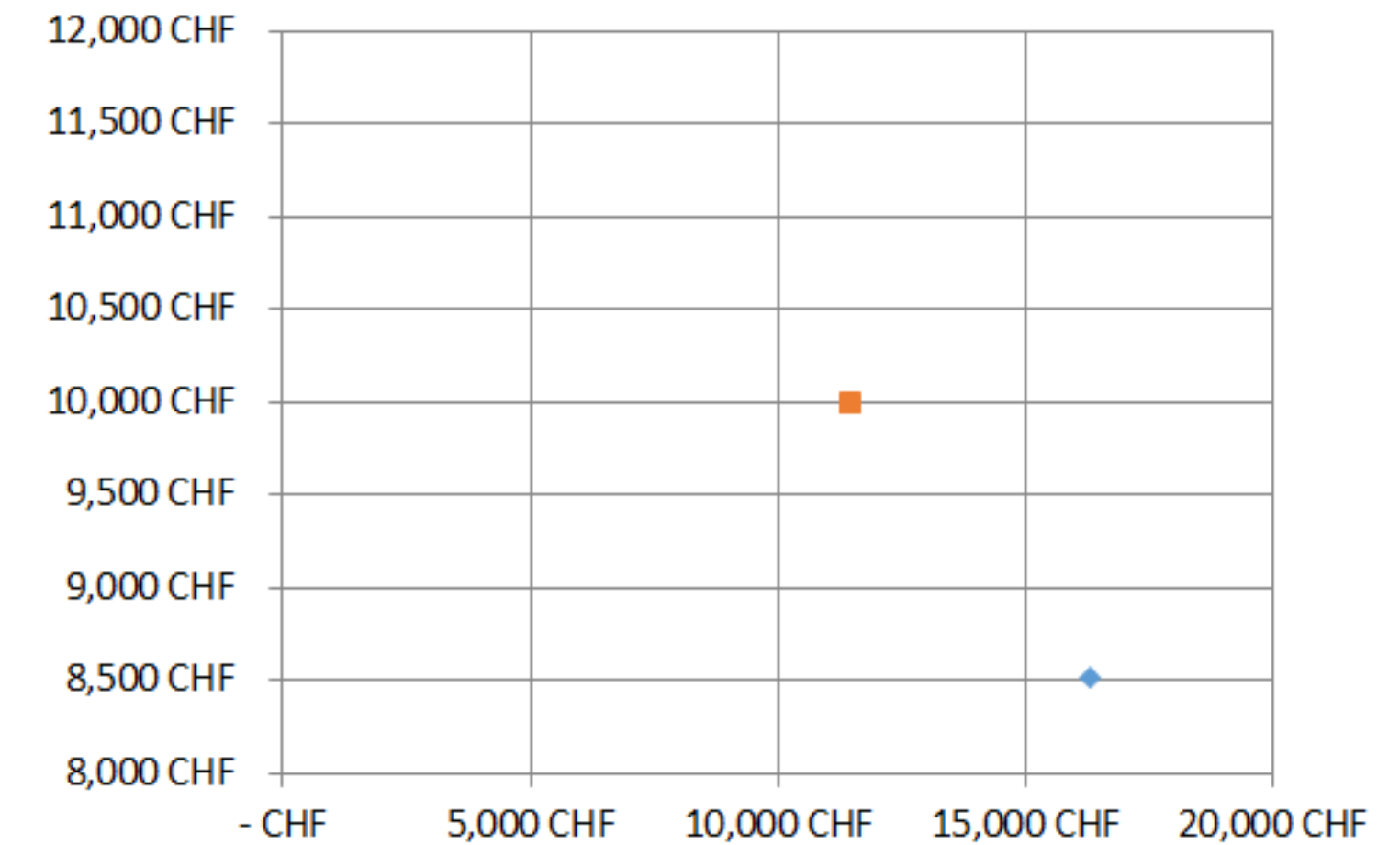
Workshop case > Expected reduction of expected losses by cyber security objective



Risk and reward

- Relationship between the probability and level of returns against probability and level of losses
- X-axis > risk exposure of an alternative as a range of possible returns of an asset or option
- Y-axis > reward (return) of an asset or option
- Interpretation “*The return of this investment is/isn’t paying off the retained risk*”
- Select investments opportunities within a tolerance
- Decide best ways to expand a business
- Avoid selecting high risk-taking projects
- Calculate the correct price to buy or sell

Workshop case > Select the best treatment plan comparing expected risk reduction versus costs



- ◆ Update incident protocol for mainframe
- Hire a specialized technical consultant

LIST OF PEOPLE WHO CAN ACTUALLY

UNDERSTAND TECHNICAL RISK REPORTS

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