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USAID
ASSIST PROJECT
Applying Science to Strengthen and Improve Systems

What we've learned from cost-effectiveness studies of improvement interventions

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Appreciating opportunity cost

"Culture Matters", etc

Outline

- **Quick general example of how we do them**
- **Specific examples from:**
  - Pakistan childhood and maternal vaccination improvement
  - Uganda SMaCKM study
- **General findings:**
  - Data issues
  - Interpreting results
  - Using results

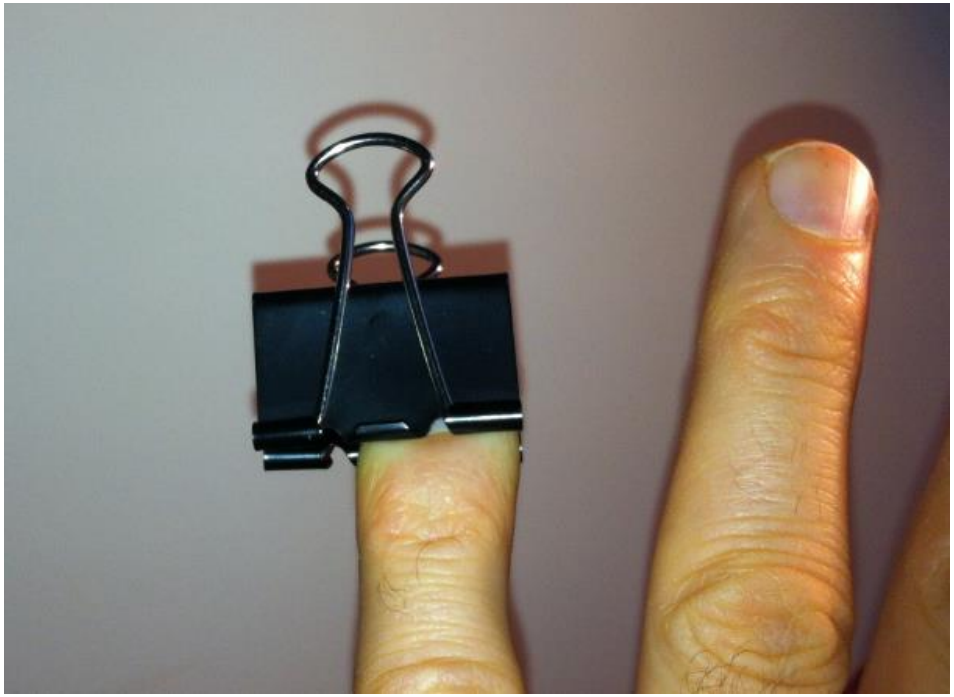
CEA of improvement intervention?

Thinking like a health economist

- **There is a 75% risk of an adverse event from a medical procedure**
- **An improvement intervention has been found to decrease this risk to 25%**
- **Intervention costs $100 per patient receiving procedure**

Is it cost-effective to implement improvement intervention?

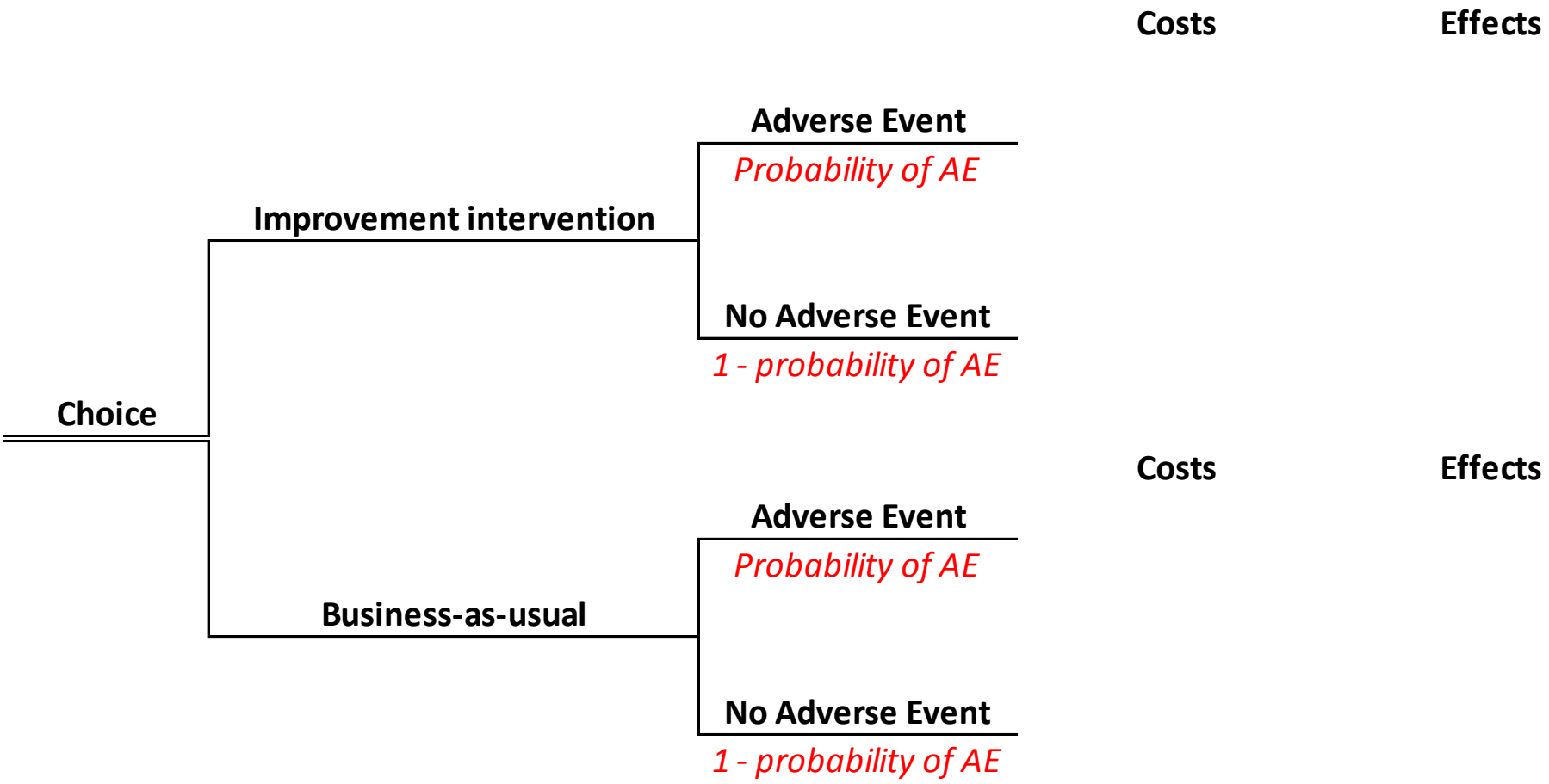
Willingness to pay



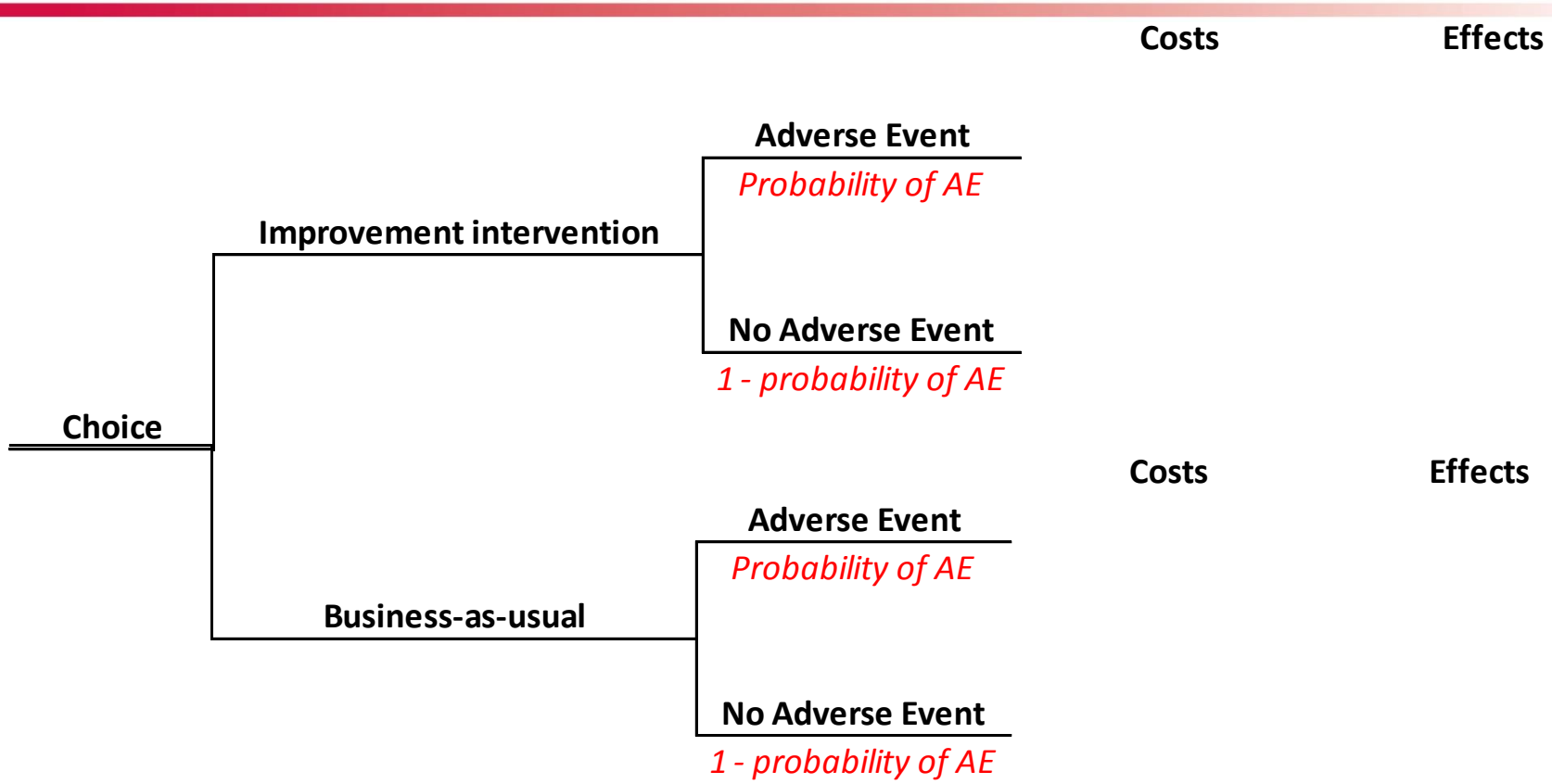
Adverse event is equivalent to this for 10 hours

Would you be willing to pay to avoid having this AE:
10 c?... €1,000,000?
€ 1? ……. € 100,000?
€ 10?……. € 10,000?
Etc.

Decision trees – comparing universes



Decision trees – comparing universes



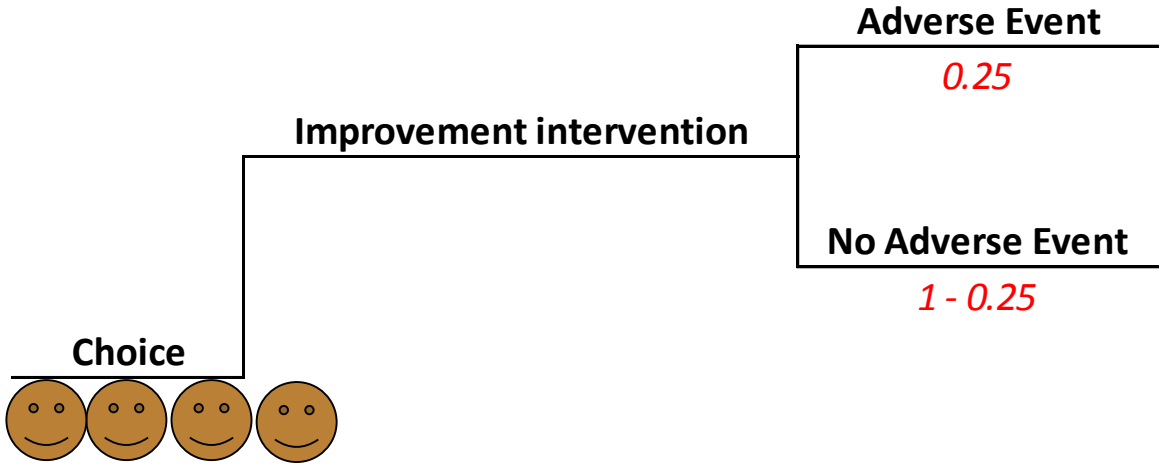
Incremental cost-effectiveness ratio = . difference in cost of 2 strategies .

difference in effects of 2 strategies

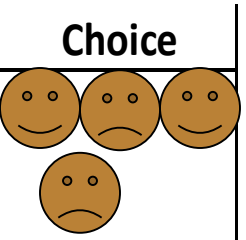
Inputs (from valid evaluation of intervention)

- P (AE w no intervention) = 0.75
- P (AE w intervention) = 0.25
- Cost of intervention per patient = € 100
- Cost of AE per patient = € 0
- Effectiveness measure = AE episode averted
- = hour of pain averted

A cohort of 4 (improvement intervention)



Cohort of 4 (no improvement intervention)



Choice

Business-as-usual

Adverse Event

0.75

No Adverse Event

1 - 0.75

Costs

€ 0

Effects

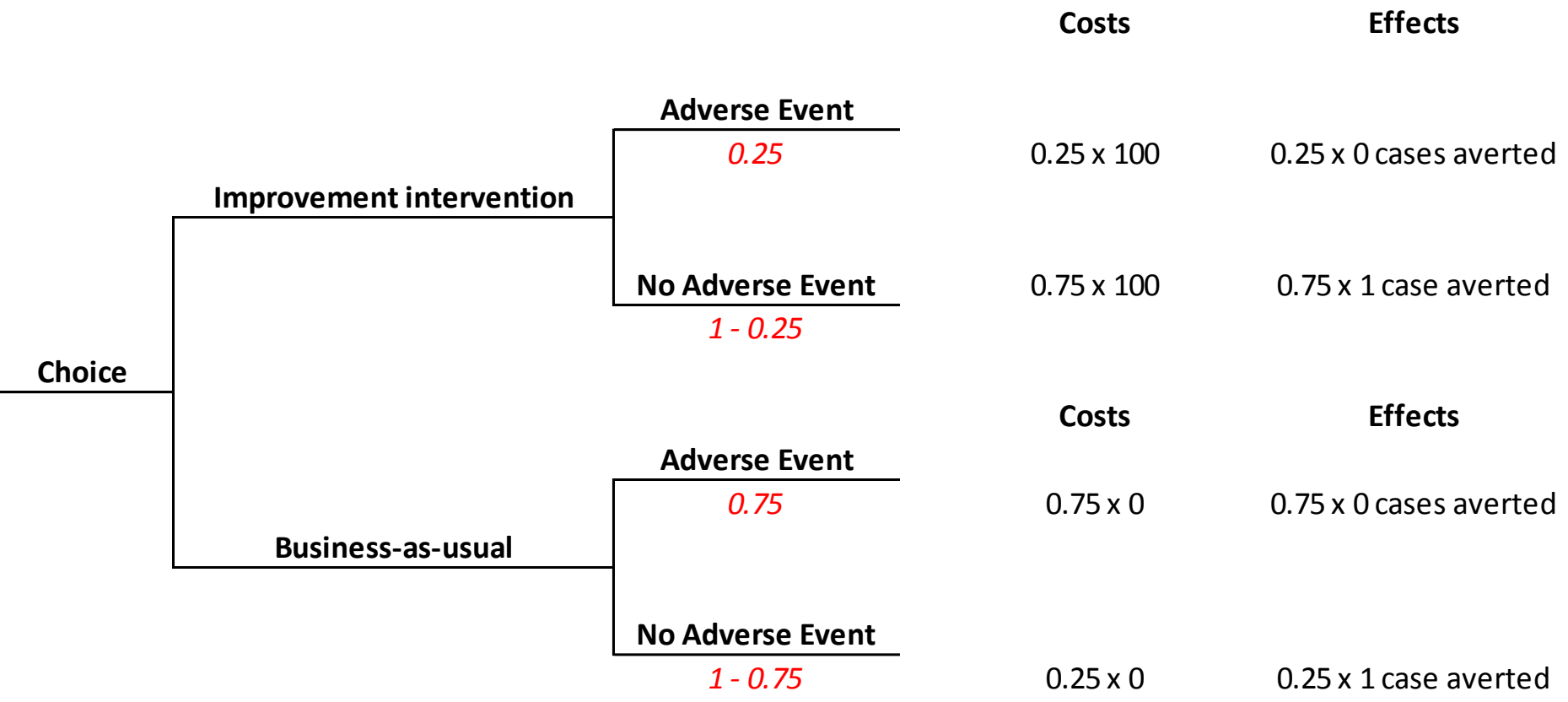
1 AE case averted

Calculation

- $\text{ICER} = \dfrac{400 - 0}{3 \text{ cases averted} - 1 \text{ case averted}}$

- **ICER = € 200 / case averted**

Tree (for individual)



Calculations (for individual)

Cost of intervention = $100 **We measure effects in cases of AE averted**

Incremental cost-effectiveness ratio = . difference in cost of 2 strategies .
difference in effects of 2 strategies

Cost of intervention — Cost of No Intervention

$$ICER = \frac{[(0.25 \times 100)+(0.75 \times 100)]-[(0.25 \times 0)+(0.75 \times 0)]}{[(0.25 \times 0)+(0.75 \times 1)]-[(0.25 \times 1)+(0.75 \times 0)]}$$

Costs
Effects

Effects of Intervention — Effects of No intervention

ICER = 100/0.5 cases of AE averted = € 200 / case averted

Is it cost-effective for you?

Table of results

Strategy	Cost	Incremental cost	Effect	Incremental effect	Inc. cost-effectiveness ratio
Intervention	€ 100	€ 100	0.75 AE averted	0.5 AE averted	€ 200 / AE averted
No intervention	€ 0		0.25 AE averted		

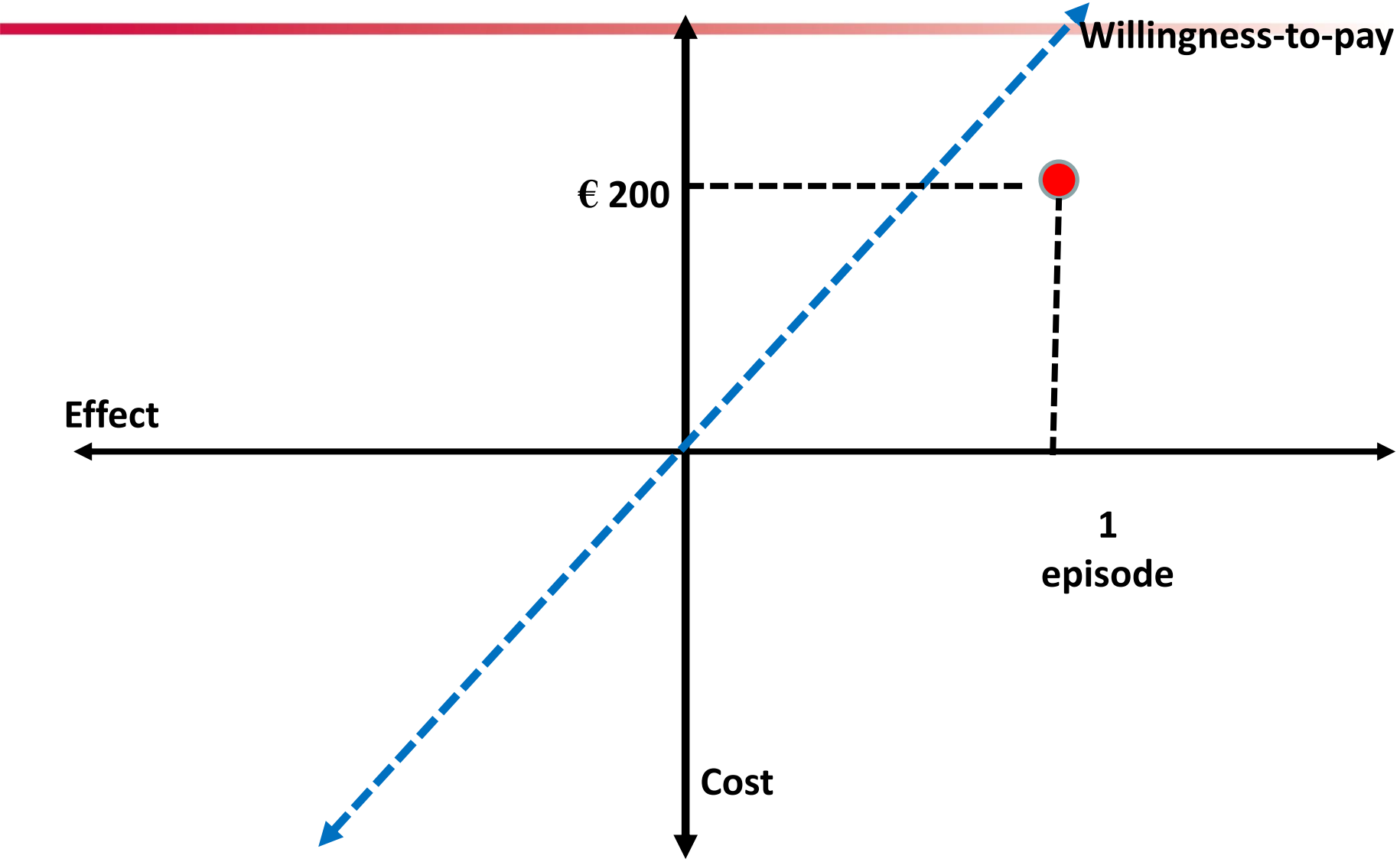
All data are per recipient of strategy

Table of results

Strategy	Cost	Incremental cost	Effect	Incremental effect	Inc. cost-effectiveness ratio
Intervention	€ 100	€ 100	7.5 hours of pain	5 hours of pain	€ 20 / Hours of pain
No intervention	€ 0		2.5 cases averted		

All data are per recipient of strategy

Cost-effectiveness plane



Inputs (from valid evaluation of intervention)

- P (AE w no intervention) = 0.75
- P (AE w intervention) = 0.25
- Cost of intervention per patient = € 100
- Cost of AE per patient = € 500
- Effectiveness measure = AE episode averted
- = hour of pain averted

Calculations (per individual)

Cost of intervention = € 100 **Cost of cases of AE = € 500**

Incremental cost-effectiveness ratio = . difference in cost of 2 strategies .
difference in effects of 2 strategies

Costs
Effects
Probabilities

$$ICER = \frac{[(100 \times 0.75)+(600 \times 0.25)]-[(500 \times 0.75)+(0 \times 0.25)]}{[(0 \times 0.25)+(1 \times 0.75)]-[(0 \times 0.75)+(1 \times 0.25)]}$$

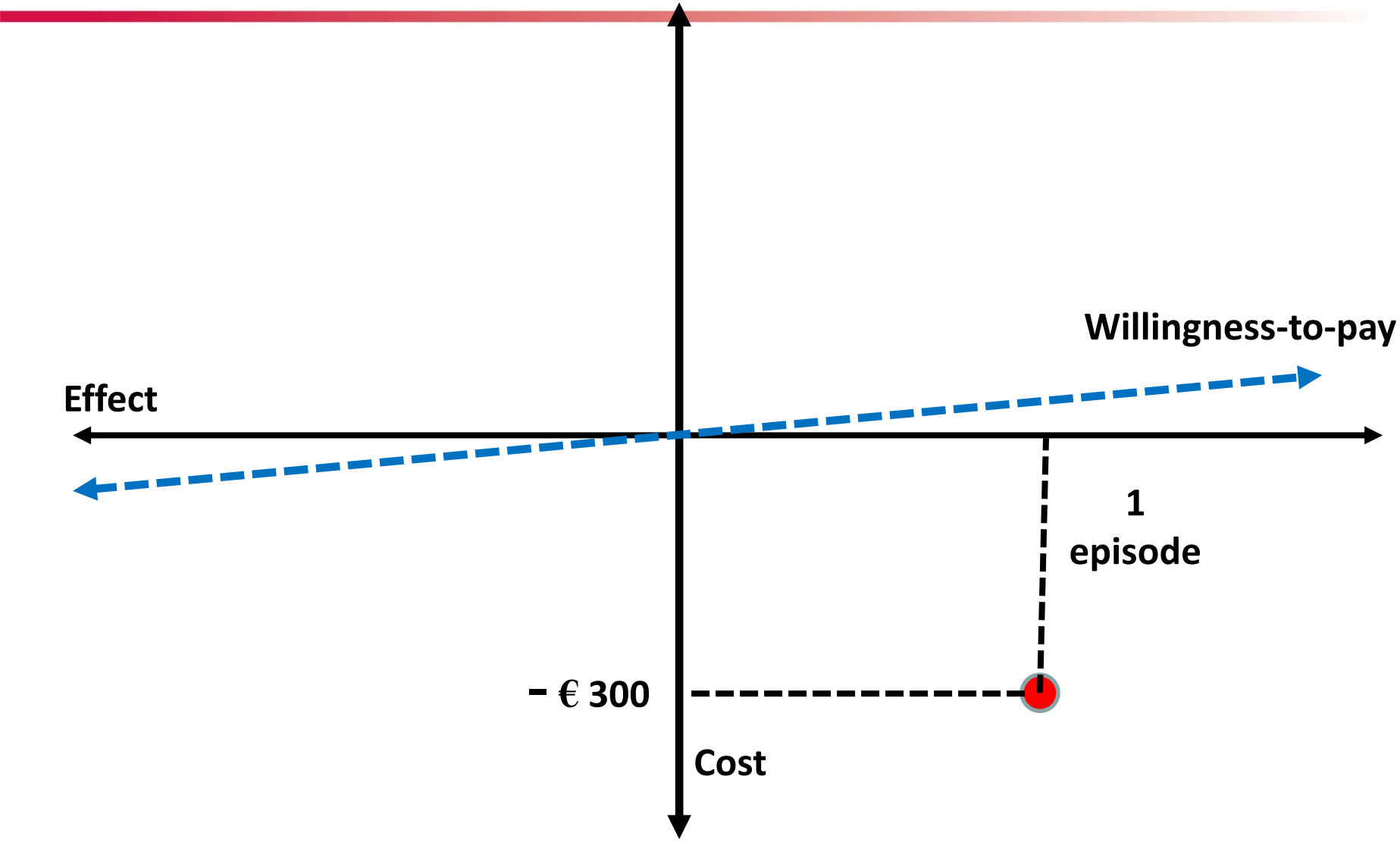
Cost of Intervention — Cost of No Intervention

Effects of Intervention — Effects of Intervention

ICER = - 150 / 0.5 cases of AE averted = - € 300/case averted

Is it cost-effective for you?

Cost-effectiveness plane



Cost-effective ≠ cost-saving

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Pakistan childhood and maternal vaccination improvement program

- **Focus on 4 low coverage district (coverage as low as 35%)**

1 out of 8 provinces

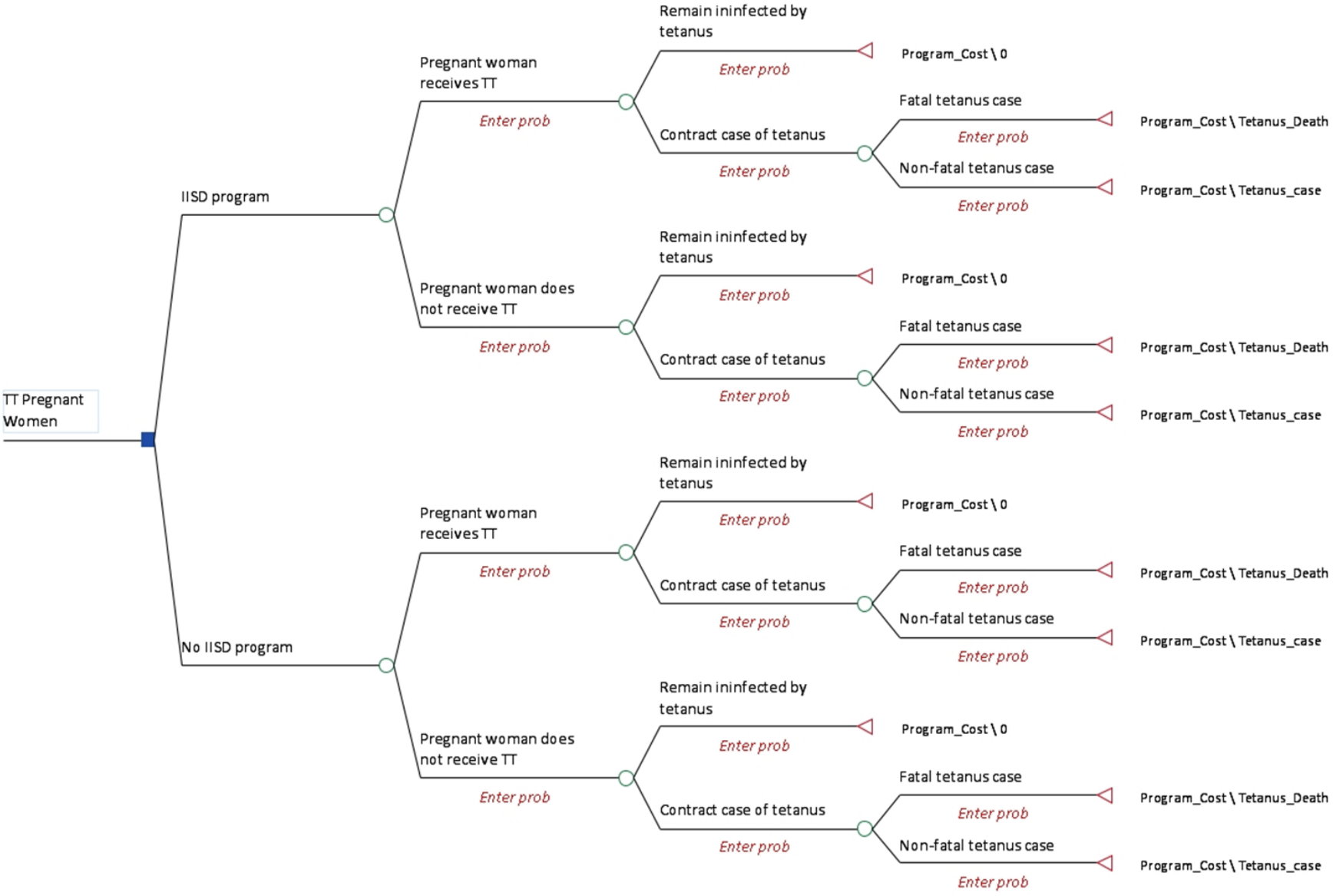
3 districts (Vax)

Intervention

- **TA to increase capacity of Rural Support Program Network (RSPN):**
- **Field staff trained on vaccines, cold chain, supply management, supervision, EPI program and registration of children and pregnant women.**
- **Engaged village-level support organizations for social mobilization/promotion of vaccination**

Motorcycles and fuel to get vaccinators out to remote communities

Cost-effectiveness analysis model



Results

Incremental cost-effectiveness ratio results (cost in 2015 USD)

Population	Perspective	Point estimate (ICER)	95% CI (ICER)		Unit
			Lower	Upper	
Children	USAID	1.30	1.08	1.58	Cost/DALY
Pregnant women	USAID	2404	1919	3765	Cost/DALY
Total	USAID	1.30	1.08	1.58	Cost/DALY
Children	GOSHD	-97	-129	-68	Cost/DALY
Pregnant women	GOSHD	2244	1975	2576	Cost/DALY
Total	GOSHD	-92.98	-121.09	-66.25	Cost/DALY

Note: Negative numbers means that the intervention is “dominant” or it decreases costs while also improving health.

Return on investment

- **Program cost-saving from GOSDOH perspective if they paid for intervention alone**
- **Therefore, USAID or another donor paying = even more cost-saving for GOSDOH.**
- **$1.56 million initial investment in the program would save the GOSDOH more than $10 million.**
- **Even with very low estimates for program effectiveness with GOSDOH, expected cost-savings is several million dollars**
- **Strongly suggests program is sustainable**

Cost effectiveness analysis of SMaCKM

- Comparison of three methods of knowledge dissemination for improvement for VMMC:
  - Manual only (M)
  - Manual plus attendance at a handover meeting (MH)
  - Manual, handover and three facility coaching visits (MHC)
- Data on quality of care from observations of VMMC:
  - Informed consent
  - History taking
  - Procedure (w anesthesia)
  - Post-op instructions
- Cost data from program funder perspective

Results

Changes from pre-to post-intervention in VMMC quality indicators

Indicator	M	MH	MHC
Signed Consent	5%	6%	0%
History	18%	1%	35%
Anesthesia	-5%	-5%	20%
Post-op instructions	10%	24%	37%

Results: Cost effectiveness analysis

For each additional $10,000 spent on one of the 3 interventions, the following results are expected:

	M	MH	MHC
Additional people who gave informed consent	443	29	17
Additional people who had 75% of history recorded	1330	NA	132
Additional people who had 75% compliance with E-B anesthesia procedure	NA	NA	31
Additional people who had 75% of post-op instructions	443	43	42

M = 8,850 patients

MH = 481 patients

MHC = 347 patients

USAID-ASSIST (and other) CEA studies

- MNCH improvement in Niger
- Improving: Kangaroo Mother Care, VAP, pediatric hospital care, HIV care in “Key populations” in Nicaragua
- Implementing chronic care model for HIV care in Uganda
- Improving HIV care in Kenya, Tanzania
- Costing studies of improving community health care for HIV in Botswana, Malawi
- Improving malnutrition management in South Africa
- Improving FP / RH in Pakistan

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General findings

- **Most (not all) have low ICERs or are cost-saving**
- **Data quality and completeness major issue**
  - Routinely collected data poor in LMICs
  - Case for attributability sometimes weak
  - Can use assumptions on long-term effects of improvement intervention
- **Outcomes data sometimes impossible to collect :**
  - Relevant outcomes outside timeframe of study
  - Process versus outcome measures

General findings: Weaknesses

- **Very few studies for comparison**
- **Self-evaluation bias**
- **Fidelity to defined intervention in complex settings**
- **Outcome data sometimes impossible to collect**
- **Extrapolating implementation effectiveness from our experts to local staff requires assumptions**

Conclusion

CEA is the perfect tool for providing information to make rational decisions on implementing improvement interventions, except for all its shortcomings

CEA is only needed is cases where health care resources are limited

It's hard. Stop whining and DO IT