

TA 4581: Developing a National Result-Based
M&E System For Key Projects
建设国家重大项目以结果为导向的
监测与评估系统

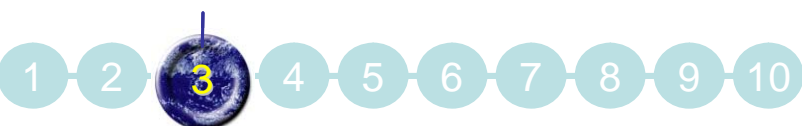
Indicators

March 2007
2007年3月

Objective (Outcome)

- Equip you with the skills to:
 - Select and define indicators
 - Anticipate data collection issues for monitoring and evaluation

Indicators



Session overview

1. What is an indicator
2. Why we need indicators
3. Outputs, Outcomes and Impacts
4. Aspects of outputs and outcomes
5. Selecting aspects for monitoring
6. Forms of indicators
7. Leading and Lagging indicators
8. Sources of performance data
9. Data quality and timeliness

Indicators



What is an Indicator ?

- An indicator is the evidence or ‘signpost’ which shows whether an output, outcome or impact has been achieved.
- Indicators should *directly* measure the achievement of the output, outcome or impact, using *numerical* measurements.
- Non-numerical indicators may be used in some circumstances, however we will concentrate on indicators that can be expressed numerically, as these are the best indicators for monitoring projects.
- Qualitative assessments may be useful in evaluation studies.

Indicators



Elements needed for an indicator

- Start with output or outcome statement → Raise youth employment
- Indicator form → Percentage of youth employed
- Raw data elements → Youth employed
→ Total youth
- Arithmetic → Youth employed/ total youth
- Baseline value → Base 65%
- Target Value → Target 80%
- Actual value → Actual 78%
- Frequency → Capture half yearly
- Format → Report in graphical format

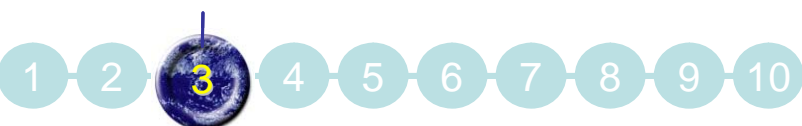
Indicators



Are these indicators ?

- | | |
|--|----|
| 1. More youth will be employed | No |
| 2. A gymnastics competition will be held | No |
| 3. An efficient and effective data base | No |
| 4. We will improve access to water | No |
| 5. Reduction in the cost of transport | No |
| 6. Health and wellbeing will improve | No |

Indicators



Are these indicators ?

- | | |
|--|-----|
| 1. Percentage of youth employed | Yes |
| 2. Number of attendees at gymnastics competition | Yes |
| 3. Percentage of legislation in data base | Yes |
| 4. Percentage of homes with water supply | Yes |
| 5. Transport price per tonne per kilometer | Yes |
| 6. Community health index | Yes |

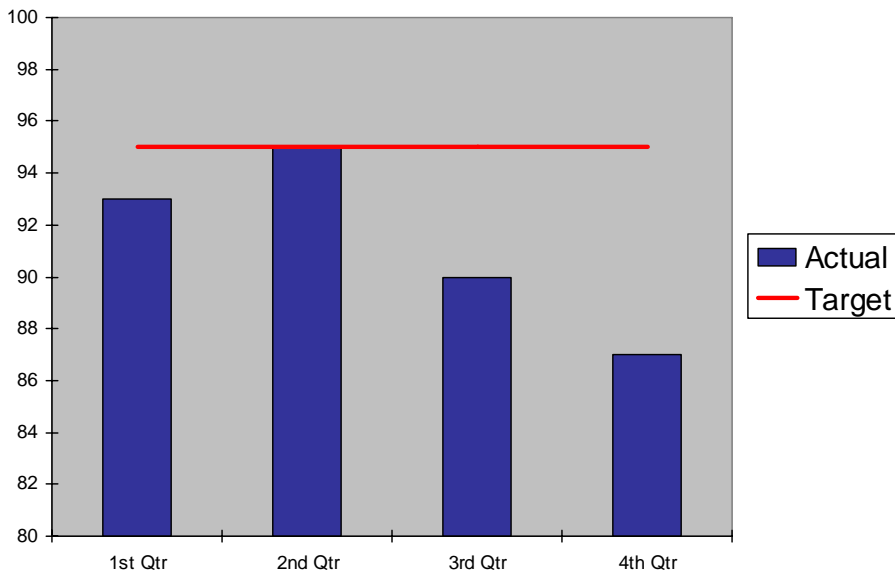
Indicators



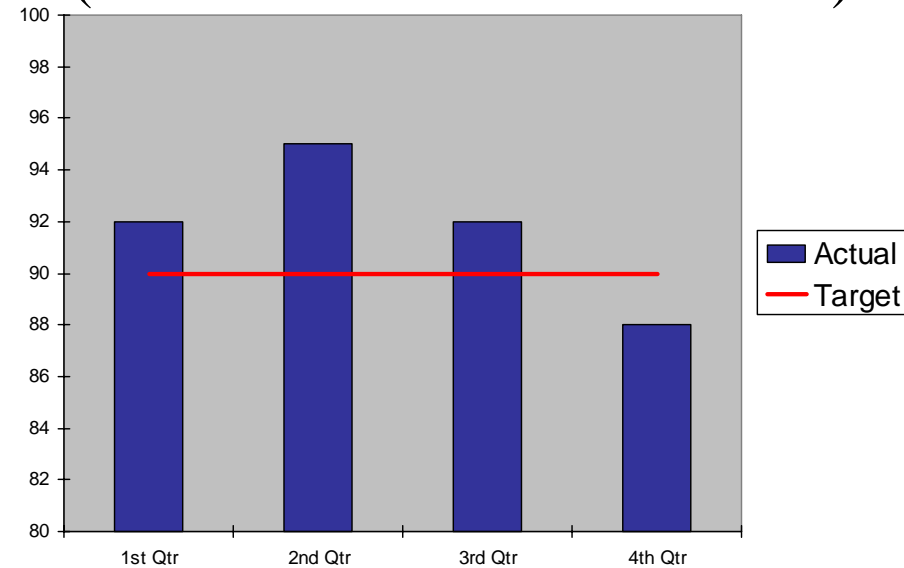
Case example



Percent of scheduled train services that ran



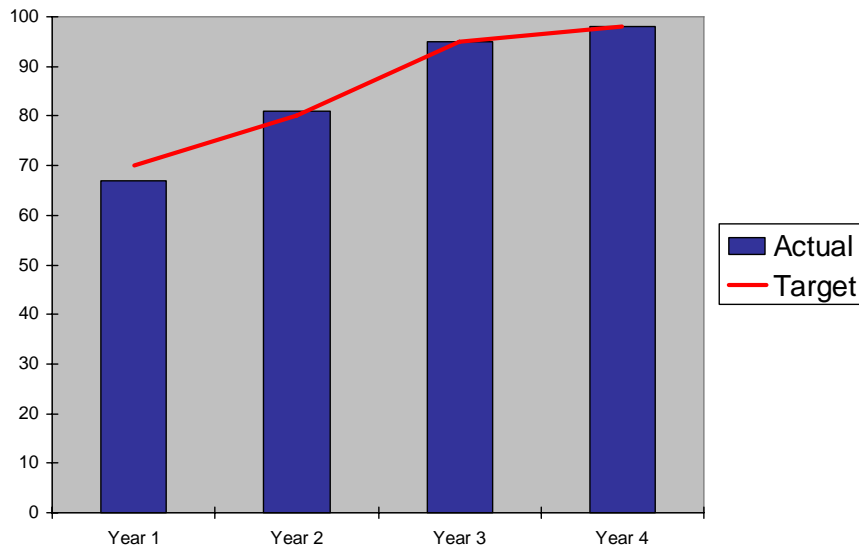
Percent of running trains that arrived “on-time” (within 5 minutes of schedule)



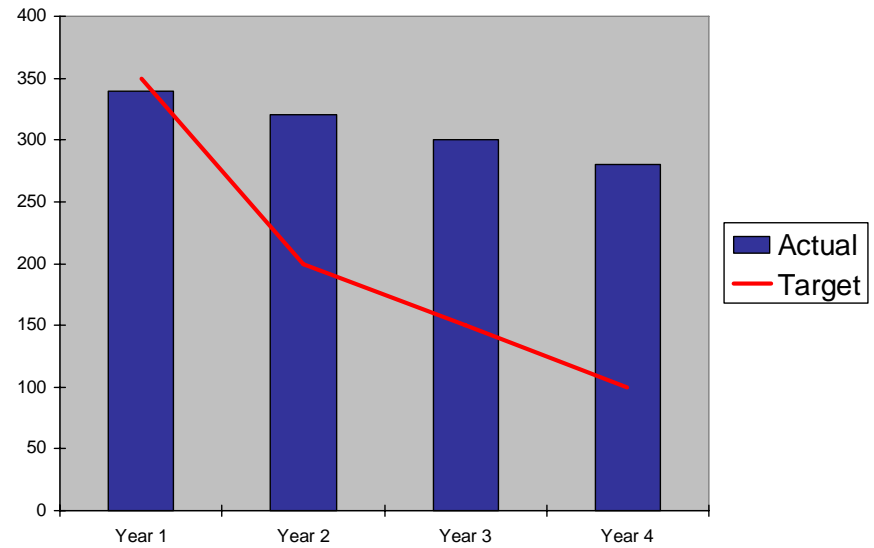
Case example



Percent of children immunized for X



Hospital admissions for X



Describing Outputs clearly.....

- Outputs are:
 - Things → we can see them, touch them, use them.
 - NOT an outcome or impact.
- No adjectives in their description:
“efficient”, “effective”, “desirable”, “fast”,
“responsive”, “functioning”, “operating”
- No trends to qualify their description:
“improve”, “reduce”, “increase”

Indicators

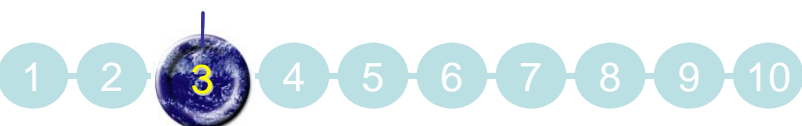


We measure and monitor specific aspects of the Outputs

- **Quality**
- **Quantity**
- **Time**
- **Access**
- **Cost**
- **Customer satisfaction**

If the project design is valid, and we deliver complete and fault free outputs, on time, and the customer has access to the outputs, and they are satisfied with them, and the cost is affordable and offers value for money, then.....the outcome will very likely be achieved.

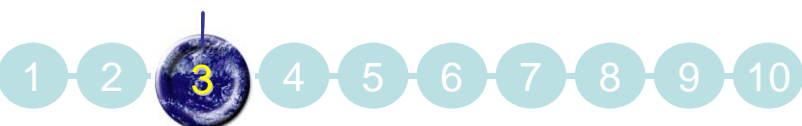
Indicators



Quality means.....

- Complete and in accordance with specification
- Fit for purpose.
- No faults, errors or omissions

Indicators



Typical Quality indicators.....

- % work packages delivered that fully met specifications
- Percent of scheduled trains that actually ran
- Number of hours electricity is “off-supply”
- Percent of houses that had their scheduled household waste collections completed
- Number of days road was closed in the year
- Percentage of errors
- Percentage of rejections on inspection
- Hours spent on rework
- Number of amendments or corrections
- Number of customer complaints on quality

Indicators



Time aspect: two types

The Time aspect covers on-time (timeliness) indicators and elapsed time (delivery time) indicators

Indicators



Examples of elapsed time indicators

- Time taken to construct a project module
- Time taken to lodge a customer complaint
- Waiting time to receive a permit
- Time for ambulance to arrive after emergency call
- Telephone call pick-up time
- *Note: When calculating averages for delivery times should exclude “outliers” – extreme cases that can distort the “average”*
- *Note: Elapsed time indicators always use units of time – minutes, hours, days etc.*

Indicators



Timeliness (on-time) indicators...

- Percentage of trains arriving on time (within -1 minute/+5 minutes of their scheduled arrival time)
- % of product deliveries in full and on time (“DIFOT”)

Indicators



Access means.....

- The ability of the target population to take advantage of the service or asset.
- It takes into account:
 - Physical ability to reach where the output or service is located;
 - Convenience of getting to the service
 - Practicality of using the service
 - Affordability of paying for the output or service
 - Technical limitations
- Access can be restricted by location, terrain, weather, transport availability, security problems, culture, illness, gender discrimination, and literacy or language problems.

Indicators



Typical Access indicators.....

- Number of applicants on the waiting list
- Time spent waiting on the waiting list
- Hours of operation (time open to public, daily)
- Number of days the road is closed due to weather
- Percent of the population living within 3 kilometres of a clinic
- Percentage of children age 5 to 15 not attending school
- Ratio of male to female students attending school
- Frequency of the public bus service
- Percent of the community that can read and comprehend government service literature
- Number of access points – e.g. point of sale locations
- Percent of households where service is available

Indicators



Unit Cost means.....

- Financial cost to deliver one unit of output
- Number of output units per input resource hour
- Resource hours to deliver one unit
- Combination of both price and usage of the resource input
- Used to monitor efficiency

Indicators



Typical Unit cost measures

- Cost per patient bed night
- Number of vaccinations per one nurse day
- Number of resource hours to process one building permit
- Cost per bus kilometer
- Construction cost per road lane kilometer
- Cost per emptied bin
- Cost per seat kilometer

Indicators



Notes on Unit cost measures

- Definition of a cost must be consistent for the target and the actual cost –
 - Just labour costs
 - All costs including overheads
 - Just direct costs – labour, materials, utilities
 - Allocation of overheads using a percentage markup on direct costs
 - Splitting a departments costs into different output categories
- Adjust for inflation of money (Inflation factor) to keep cost comparisons on a consistent base

Indicators



Customer satisfaction means.....

- We satisfy their expectations
- Customers do not complain
- Customers return for repeat service outputs
- Customers do pay for their service
- Customers refer or recommend the service
- Customers abide by the rules (by-laws) when they receive their service
- Customers treat other customers with respect
- Customers are honest users of the service and do not abuse it

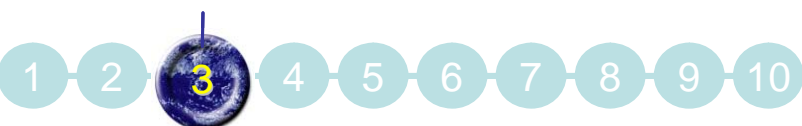
Indicators



Typical Customer satisfaction measures

- Percent of customers that are satisfied (score 3.0/ 5)
- Customer satisfaction index (Likert scale 5)
- Number of customer complaints received
- Percentage of repeat customers
- Percentage of bad debts to total revenue
- Average debtor days
- Number of customers fined for fair evasion
- Number of customer prosecutions
- Percent of customers to target population
- Market share

Indicators



Notes on Customer satisfaction

- Request for service is not necessarily a complaint
- Bad debts may be driven by affordability and culture as well as dissatisfaction
- Fair evasion and prosecutions may also be attributable to culture and law enforcement
- Likert scale 1-5 (or 1-7) is normally used to quantify “satisfaction”
- Customer survey is designed using contact points and statements of positive expectations

Indicators



A typical customer survey.....

Customer Survey to Assess the Satisfaction of Reception at the City Hall Annex

Name: _____ Date: _____

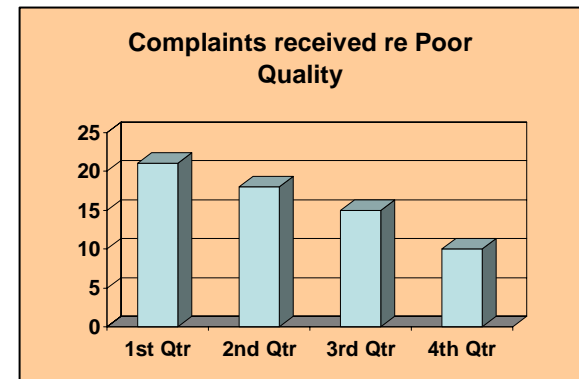
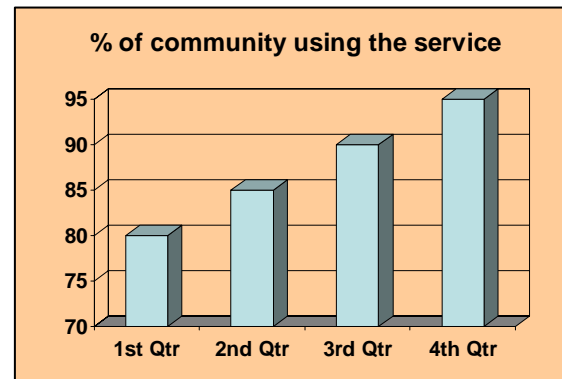
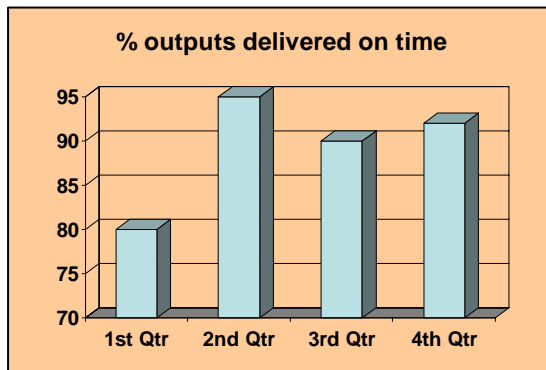
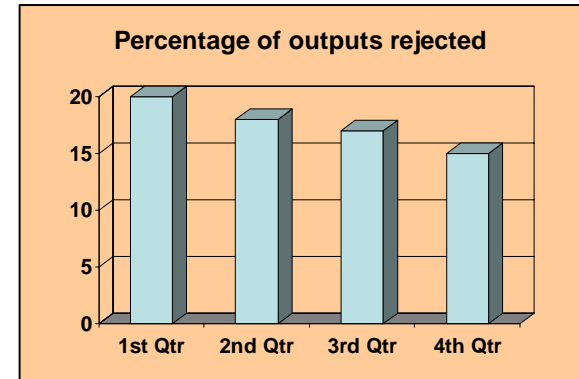
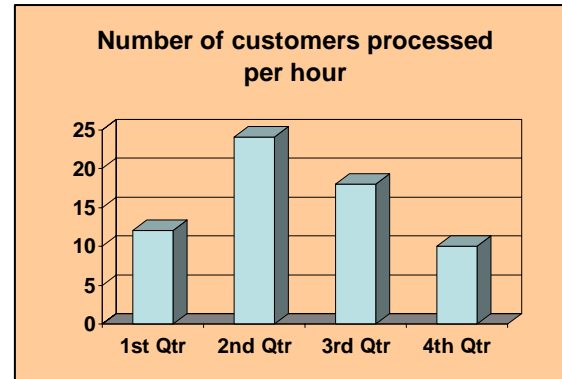
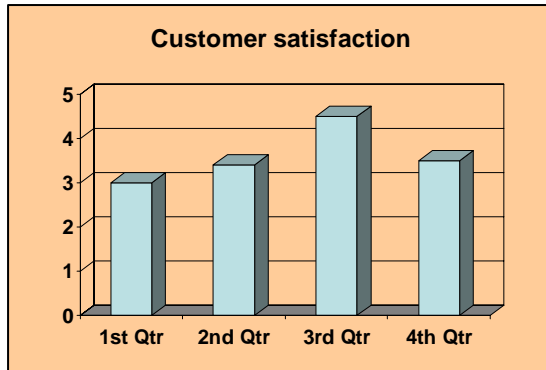
Please read the following statements concerning you as the "customer" of the City Hall, and rate your level of agreement with each statement.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Customer enters City Hall					
The guard at the entrance was polite and helpful to me.	1	2	3	4	5
Upon entering the main entrance of City Hall Annex, I was able to determine where to go for your service.	1	2	3	4	5
The directory and signage were visible and able to assist me.	1	2	3	4	5
Customer assistance desk was available in the area.	1	2	3	4	5
If customer assistance desk was available – there was a receptionist there to assist me.	1	2	3	4	5
The receptionist was willing to provide assistance to me.	1	2	3	4	5
The information provided by the receptionist was accurate	1	2	3	4	5
The information provided by the receptionist was adequate	1	2	3	4	5
The information provided by the receptionist was timely	1	2	3	4	5

Indicators



Choose a combination of output aspects to set up monitoring indicators

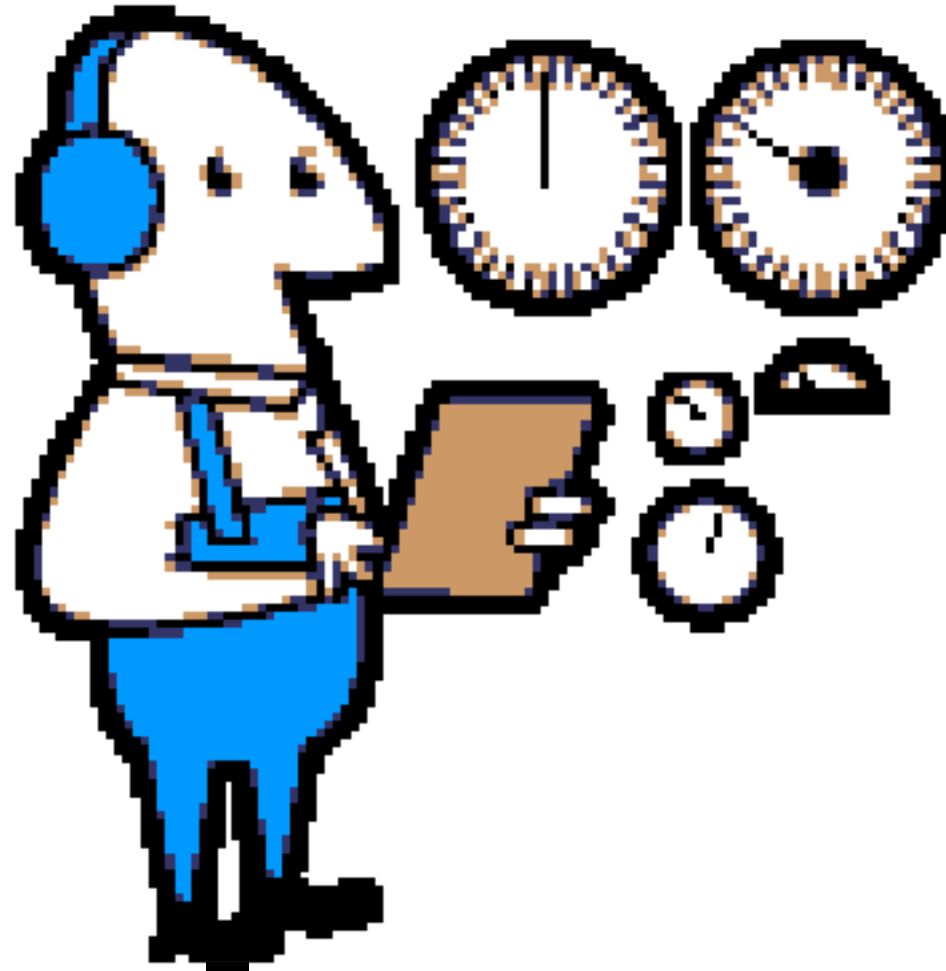


We cannot assume that because one is good, the others are good

Indicators



Which outputs to measure, which of their aspects to measure



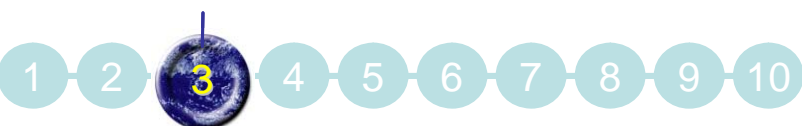
Indicators



Select Outputs to measure

- May be many outputs in the project
- Choose the most important
- Choose the ones most customers will receive
- Choose the ones with higher risk associated
- Choose the more expensive
- Choose the most politically sensitive
- Choose those that have historically been problematic
- Choose those that may be open to fraud
- DON'T just choose everything !

Indicators



For each output – choose Aspect

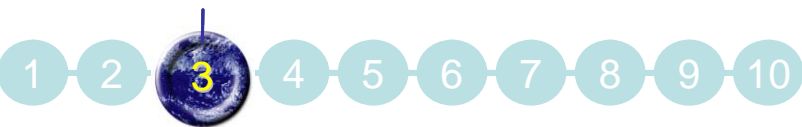
- Options are – Quality, Timeliness, Access, Unit cost, Customer satisfaction
- Choose aspects that are most important and consistent with the choice of the output.
- For example if prevention of fraud is expected to be important, look at which aspects of outputs would point to it when measured: e.g. quality and unit cost.

Indicators



Next - Outcomes

Indicators



Be clear about Outcomes

- The Outcome is NOT the output – don't confuse them
- An Outcome is a result, change, or benefit that directly arises from the project outputs (and relates to the original root problem in the project design)

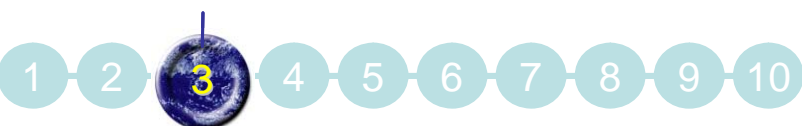
Indicators



Outcome *indicators*...

- Do not include the extent or direction of change in the name of the outcome indicator (e.g. electricity outages will decrease by 20%) ...
- ... these will be considered when we look at Baseline Data and setting Targets
- Test – “Is this indicator reflecting a visible change in capability, behavior, productivity, knowledge, health, or conditions, that relates to the original root problem ?”

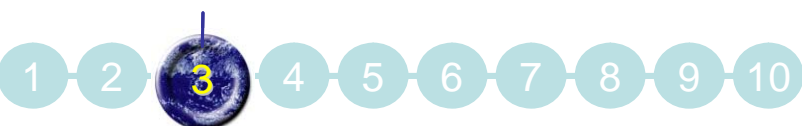
Indicators



Are these “outcome indicators”?

- | | |
|---|-----|
| 1. Increased electricity generation | No |
| 2. MW-Hours of electricity supply | Yes |
| 3. Improved hospital access | No |
| 4. Community health index | Yes |
| 5. Reduced time to cross the river | No |
| 6. Number of people employed in river-side industries | Yes |
| 7. Improved farmers’ irrigation skills | No |
| 8. Rice production per year in region | Yes |

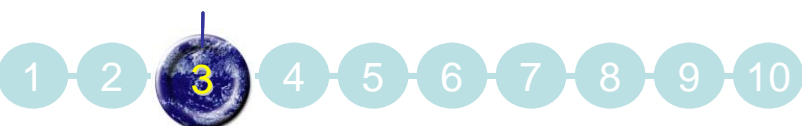
Indicators



Be clear about Impacts

- The Impact is NOT the outcome – don't confuse them
- An Impact is a result, change or benefit that develops, over a period of time, from the continuing achievement of the project outcomes.
- Impact is wider in scope and influenced by many factors other than the project.
- Typically, impacts are socioeconomic:
 - increased employment
 - higher household incomes
 - greater investment in the region
 - reduced morbidity rates
 - increased longevity
 - increased literacy

Indicators



Impact *indicators*...

- Do not include the extent or direction of change in the name of the outcome indicator (e.g. foreign investment in the special economic zone will increase by 20%) ...
- ... these will be considered when we look at Baseline Data and setting Targets
- Test – “Is this indicator reflecting a visible change in capability, behavior, productivity, knowledge, health, or conditions, that relates to the consequences of the original root problem?”

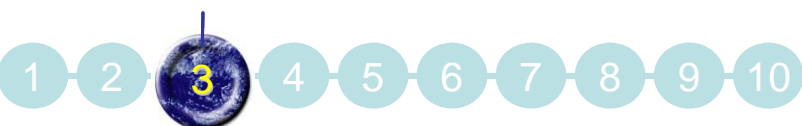
Indicators

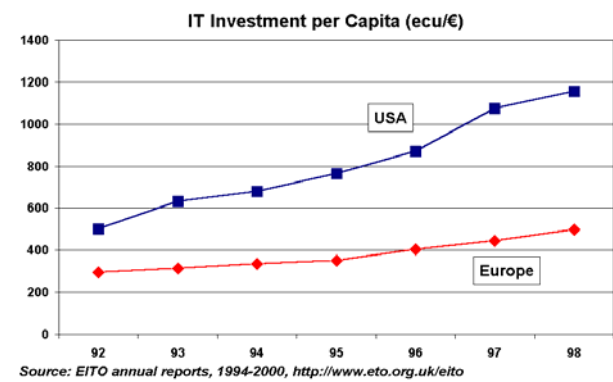
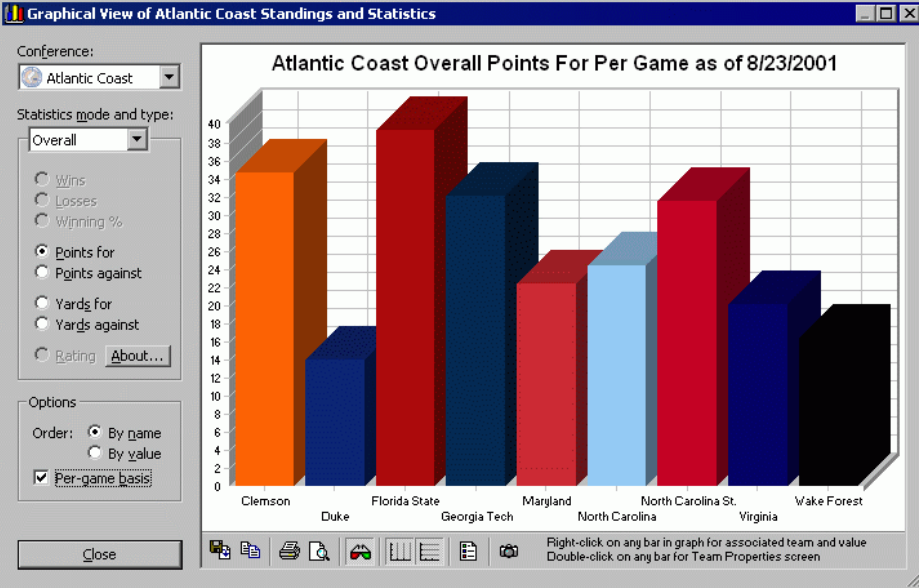


Select outcomes and impacts to measure

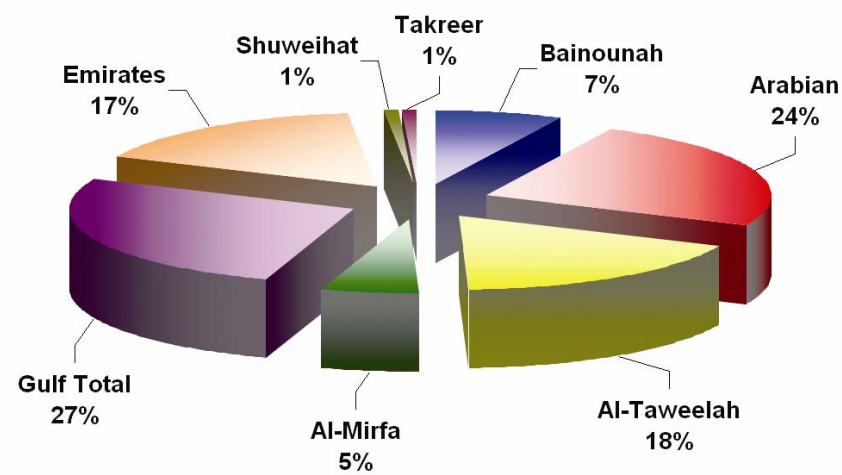
- Cannot monitor everything
- Trade off between cost of monitoring and benefits
- Insurance against poor project performance
- Probably justify 5-8 outcome indicators and 1-3 impact indicators at most.

Indicators

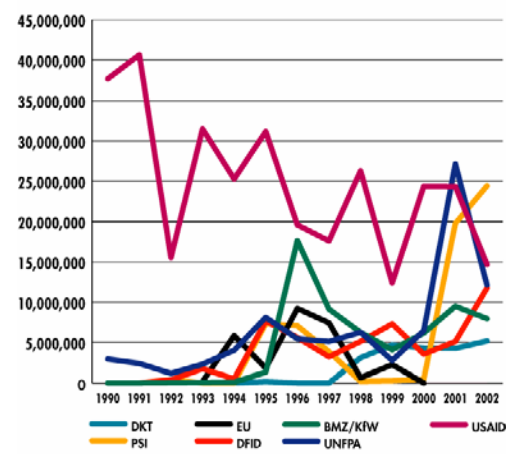




Forms of indicators

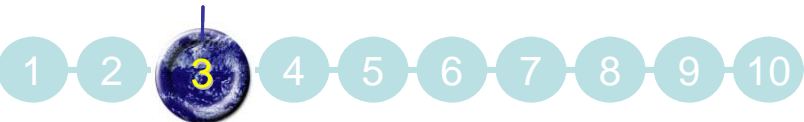


Donor Funding for Condoms, 1990-2002 (current US\$)



Source: UNFPA, 2004. Database on Donor Support for Contraceptives and Logistics Management. New York: UNFPA.

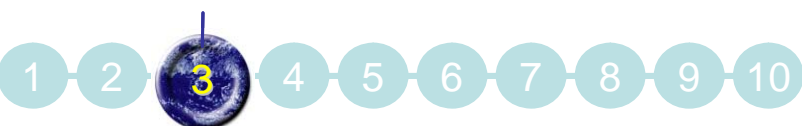
Indicators



Simple absolute value

- Simple value or count
- The reference base must remain constant
- Limited usefulness
- Example:
 - Number of students passing from standard class of ten
 - Number of infringement notices issued by each enforcement officer in a week

Indicators



Proportional measure

- Use ratios (such as percentages) when the reference base varies
- Examples:
 - Ratio of students to teachers
 - % of sitting students that pass their exam
 - % of waste collection trucks on the road
 - % of bins returned emptied and upright

Indicators



Unit cost measure

- Typically total financial cost divided by the number of outputs
- RMBY320million/ 200 lane-kilometers of road = RMBY1.2million per lane-kilometer
- Definition of cost must be consistent for the target and actual calculations
- If measuring over time, factor out the money inflation effect to give the real unit cost

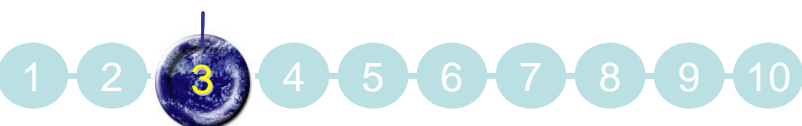
Indicators



Unit cost measure.....

- Is not necessarily “money”
- Can use other definitions of resources
- Labour hours, Equivalent Full Time employees (“EFT”)
- Can be Resources/ outputs; or
- Outputs/ resources
- Examples:
 - Resource hours to service one truck; or
 - Number of trucks one person day can service

Indicators



Other unit cost measures

- If you are concerned with fraud, corruption or waste, then consider other resource usage measures or inputs/outputs ratios
- Examples:
 - Tonnes of gravel/ road lane-kilometers built
 - Tonnes of asphalt/ road lane kilometers re-sealed
 - Machine hours/tunnel volume excavated
 - Concrete tonnes/elevated roadway lane-kilometers

Indicators



Simple index

- Based on a reference at a point in time
- Reference is a group of like items
- Reference point is set at “1” then all consequent measures are in relation to that original point
- Examples:
 - Consumer price index (food, housing, clothing, etc)
 - Rural produce price index (grain, meat, dairy, etc)
 - Fuel price index (diesel, petrol, kerosene, solvents etc)
 - Transport price index (wheat, frozen foods, fuel, etc)

Indicators



Simple index example....

As at Jan 2005

Petrol	\$1.00/ liter
Diesel	\$1.50/ liter
Solvent	\$3.00/ liter
Total	\$5.50
Index	1

As at Jan 2006

Petrol	\$2.00/ liter
Diesel	\$2.20/ liter
Solvent	\$4.80/ liter
Total	\$9.00
Index	1.636

Fuel inflation=
63.6%

Indicators



Mean.....

- Arithmetic average.
- Sum the results, divide by number of samples.
- Not good with outliers – extreme results that can distort the average.
- Not good for “Timeliness” where we may have some problem events that take a long time to resolve.
- Skewed distributions bias the mean.
- Sample of results needs to be extensive so any outliers have less impact upon the results.

Indicators



Mode.....

- Is the most frequent value in a sample.
- Most often used to measure timeliness.
- Eliminates the impact of outliers.
- Excel can calculate the mode
 - Insert/ Function/ Mode (data : data)

4
4
2
5
4
327
Mode = 4

Indicators



Median.....

- Mid point within a set of sorted data.
- Best used to measure timeliness and income/wealth indicators.
- Eliminates impact of outliers.
- Does not require a large data sample.
- Central tendency of skewed distributions is best described by the median.
- Excel can calculate the median
 - Insert/ Function/ Median (data : data)

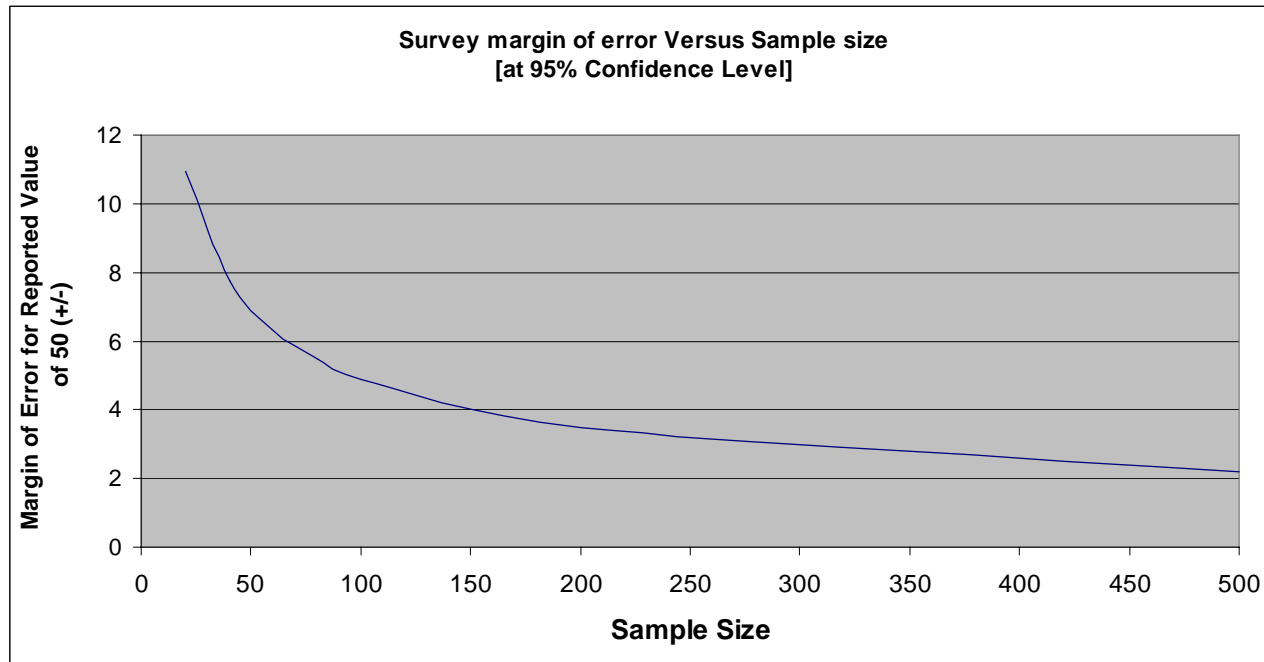
	2
	3
	4
	4
	4
	5
→	6
	6
	7
	7
	8
	9
	327
	Median = 6

Indicators



Survey sample size.....

- When surveying, we have to balance cost and complexity of the survey effort against the desired margin of error.
- Larger sample sizes reduce the margin of error but the effect is not linear – diminishing improvement as sample size grows.

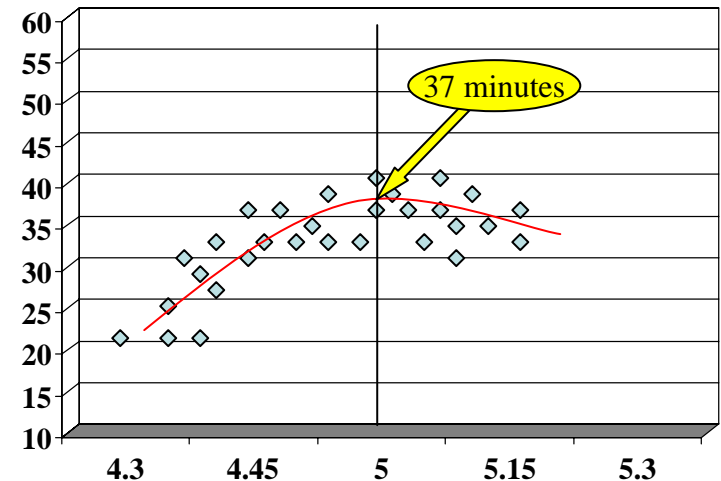


Indicators



Interpolation.....

- Interpolate a value by reference to a number of data samples around the desired point
- ? – how long does it take to cross a bridge at 5pm on Friday
- Sample timings are taken from around 4.30pm to 5.30pm and then the point at 5.00pm is interpolated from the graphed result
- Used when a number of samples cannot be taken at the exact time.
- Use Excel to fit a model equation to the data.

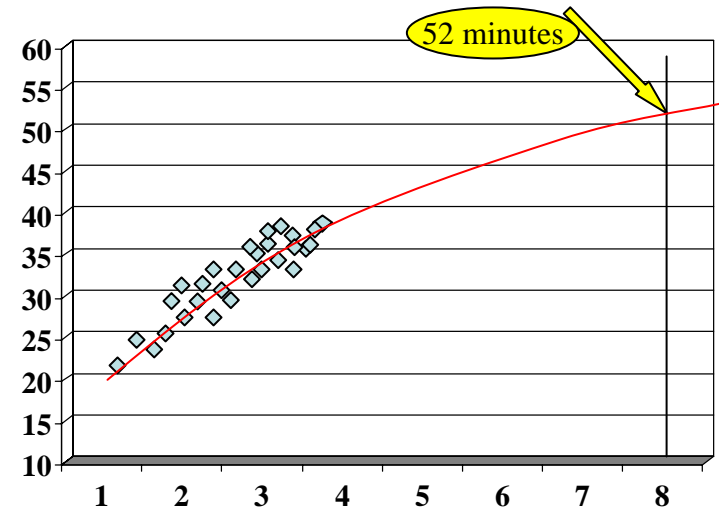


Indicators



Extrapolation.....

- Extrapolate a value by reference to a number of factual data samples
- ? – how long will it take to cross the bridge in 5 years time
- Sample timings are taken at the same time each month for three years.
- Sample points are then extrapolated using a best fit line - use Excel to fit a model equation to the data.
- BEWARE of extrapolating too far beyond the known data – reality may differ from the mathematical model in other data ranges.



Indicators



Forecast.....

- Based upon historical factual data
- Apply assumptions or “rules” on how the data values will vary in the future
- May use raw data not directly related to the forecast indicator, but has a correlation
- Example:
 - What will be the incidence of hepatitis in 5 years ?
 - Base data is current population and incidence at .5%
 - Assume population growth at 5%
 - Assume hepatitis incidence declines 20% pa
 - Result isnext page

Indicators



Forecast.....

Year	Population	Incidence %	Incidence No
Base	10000000	0.005000	50000
1	10500000	0.004000	42000
2	11025000	0.003200	35280
3	11576250	0.002560	29635
4	12155063	0.002048	24894
5	12762816	0.001638	20911

Incidence in 5 years

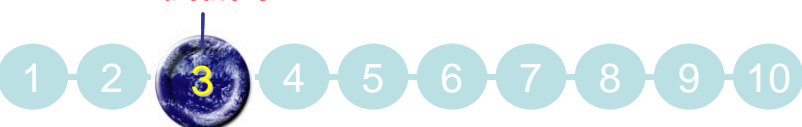
Indicators



Leading and Lagging indicators

- Lagging indicator reports history
- Lagging indicator is defined exactly in terms of the output or outcome
- Leading indicator gives you insight to what is likely in the future
- Leading indicator is defined in respect of a condition, event, circumstance that is likely to affect the future output or outcome

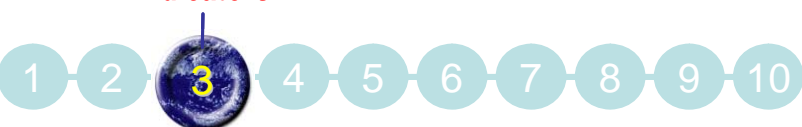
Indicators



Lagging indicator

- Outcome → Improve employment
- Lagging indicator is % employed
- It is “lagging” because the result takes some time to develop
- If we miss the target, there is not much we can do to correct the failure
- Need some other indicator that acts as a prediction of the outcome indicator – this is a “leading” indicator

Indicators



Leading indicators

- Outcome → Improve employment
- Leading indicator is number of job vacancies advertised
- Leading indicator works because it has a known relationship with the lagging indicator that has been revealed in past studies of employment trends

Indicators

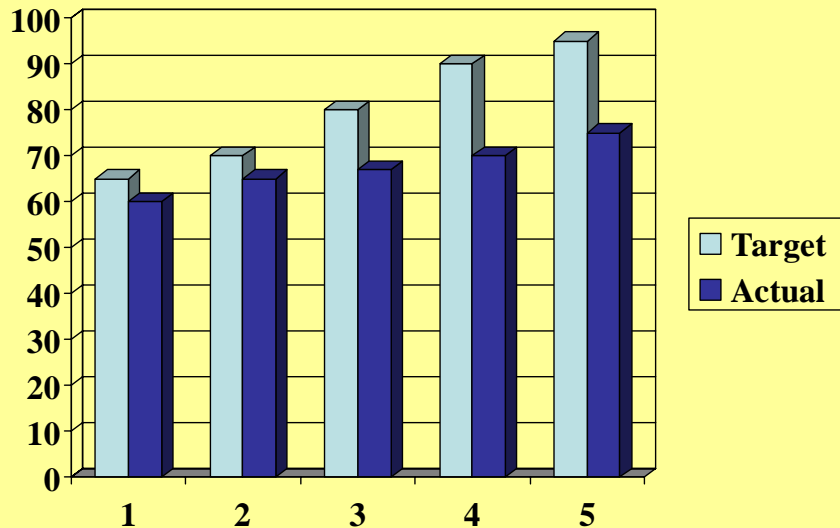


Leading and Lagging indicators

- Outcome → Improve youth employment

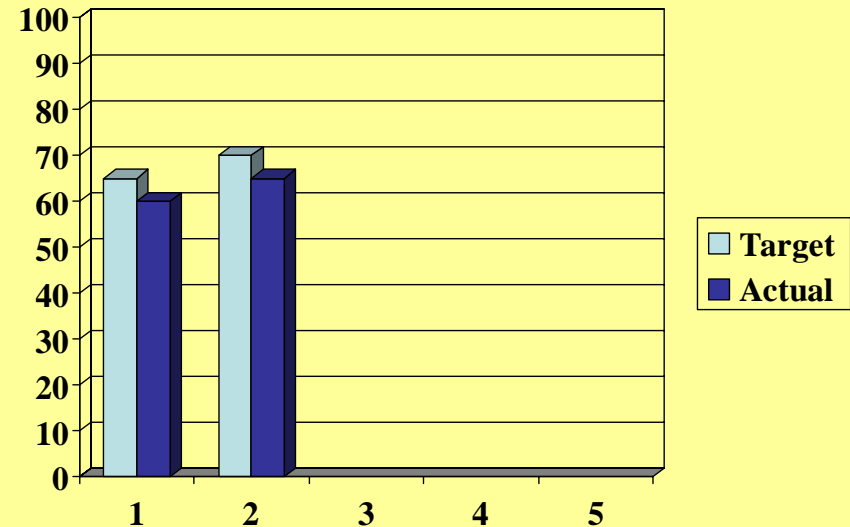
Leading

% of 16 year old youth in full time school



Lagging

% of 18 year old youth in full time employment



Indicators



Proxy indicators

- used when specific indicators are not practical, for example if they require extensive collection of primary data

Indicators



Defining the indicator.....14 steps

1. Read and understand the project design
2. Clarify outputs, outcomes, impacts, risks and assumptions
3. Consider all aspects for each output
4. Consider leading indicator subjects for outcomes
5. Choose output aspects, risks, assumptions, outcomes, impacts and leading indicators for measurement and monitoring
6. Name the indicator
7. Describe the indicator
8. Name the data elements
9. Name any data exclusions
10. Identify the source of the data
11. Describe the arithmetic required to calculate the indicator
12. Nominate the frequency of reporting
13. Nominate the format of reporting
14. Nominate the responsible person/ position to deliver the indicator report

Indicators



Indicators need to be practical

- Consider available data first (including secondary sources)
- Measure only what is important
- Limit the number of indicators to the minimum necessary to measure the respective result level
- Ensure that the means of measuring is cost-effective

Indicators



Sourcing indicator data.....

- Project accounting and statistics system
- Consultant led survey or assessment
- EA ministry systems – funds disbursement or statistics systems
- Enforcement agencies – police, legal, public prosecutor
- Health related agencies – hospitals, births and deaths registries, immunization
- DMC Bureau of statistics
- Other projects with similar data systems

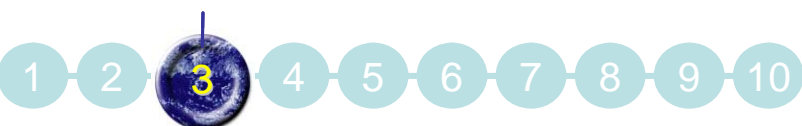
Indicators



Data quality and timeliness...

- Ensure data quality and timeliness by:
 - Defining data collection within the project activities, and as a specific output
 - Including in the project manager's brief, the requirement for indicator data collection and reporting
 - Using an independent data collection consultant
 - Allocating funds for specific data collection activities
 - Providing incentives and disincentives for quality and timely data
 - Including quality and timeliness indicators for project indicator data within the project design

Indicators



Data Sources

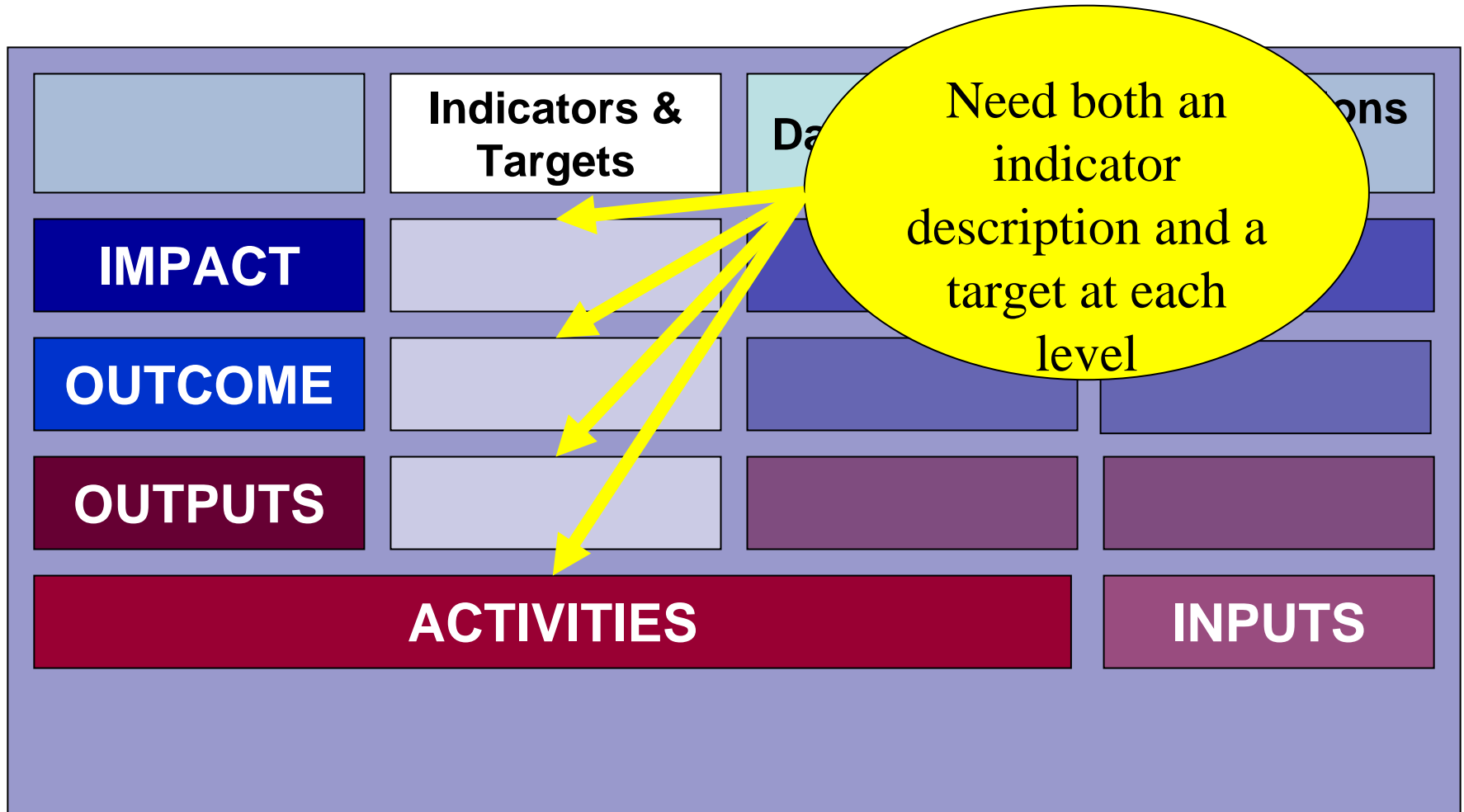
Reporting Mechanisms

- **Where** can information on the status of each indicator can be obtained
- **Who** should provide the information
- **How** is the information collected (primary data), e.g. sample or full surveys, project records, participatory or rapid appraisal methods, focus group discussions, field observations, balanced score cards.

Indicators



Indicators in the Design and Monitoring Framework



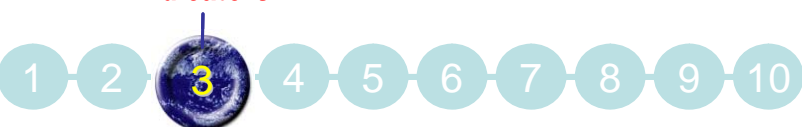
Indicators



Workshop (案例研讨)

- Break into groups.
- Take the Design and Monitoring Framework and project documents you are given for the case example and:
 1. develop a list of possible indicators
 2. define their data components, using the handout worksheet;
 3. decide the data sources and frequency of measurement best for monitoring the indicators;
 4. report back.

Indicators



END

Indicators

