

**Measuring Economic
Benefits of CMMI:
Leveraging the
Interpretive Structural
Methodology**

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Presentation #7146

Presenter:

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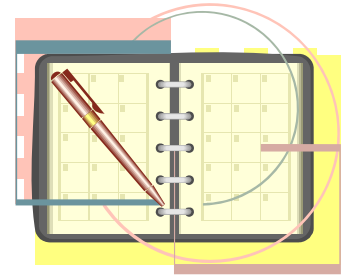
Presentation Objective

- To show the audience an approach to guide a software process improvement activity by prioritizing tasks according to the organization's business objectives



Presentation Agenda

- IGSI-ISM Benefit/ Business Objectives Model
- The Rosetta Stone Method
- Continuous Improvement Cycle
- Goal-Question-Metrics
- An Example
- Discussion



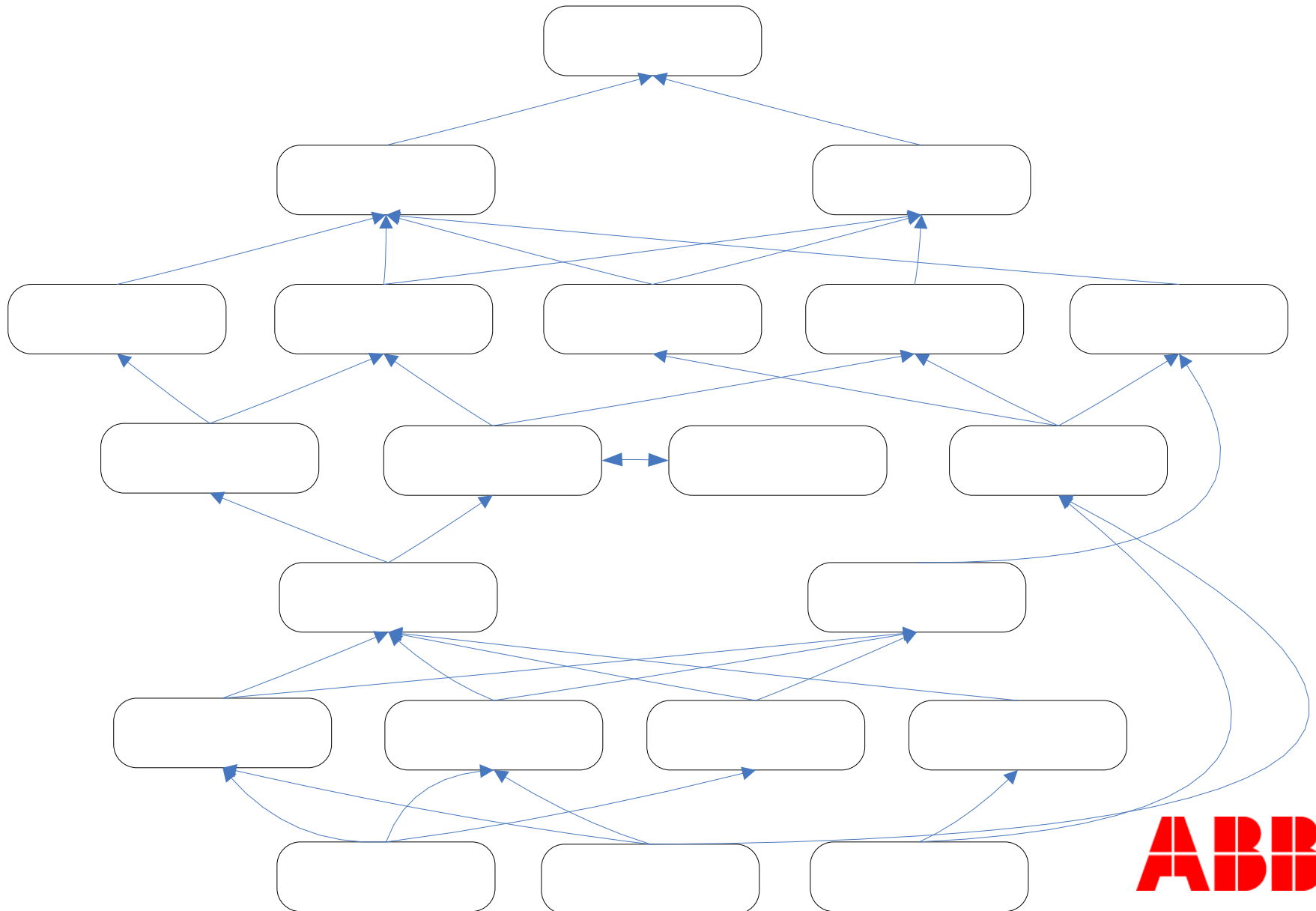
IGSI-ISM Benefit/ Business Objectives Model

- Goyal et al. [*], as part of research undertaken on the benefits of software process improvement for IBM Global Services, India (IGSI), held two workshops that used consensus-based responses as inputs for an Interpretive Structural Modeling (ISM) methodology to develop a model of the business needs and consequences of improving software development processes
- This model is called the **IGSI-ISM ROI Model** and shows the relationships among the various business benefits that can be derived from a software process improvement activity
- This model shows 21 separate identifiable benefit areas

* Goyal, S. Kanungo, V. Muthu, and S. Jayadevan, (2001). "ROI for SPI: Lessons from Initiatives at IBM Global Services India," presented at SEPG 2001



... IGSI-ISM Benefit/ Business Objectives Model



Rosetta Stone Method (RSM) *

- Focuses on business benefits, not on specific processes
- Creates a roadmap that follows the benefits that the business wants to derive, and then looks at the processes that need to be addressed
- Provides a generic and pre-defined software process improvement benefits model that can be used by any organization
 - The benefits model is hierarchical with built-in interdependencies
 - Each benefit is measured by metrics or indicators to measure the improvement or degradation as a result of changes in the process

* Fionbarr McLoughlin (2008), “The Rosetta Stone Method”;
University of Limerick. Ph. D. Presentation, January 18th, 2008



. . . Rosetta Stone Method (RSM) *

- In RSM, benefits identified in the model are mapped to CMMI process areas
- This allows an organization to view the contribution that each CMMI process area provides to each benefit
- The organization then will see which processes need to be improved to derive the desired business benefit
- Progress is monitored by using the metrics or indicators defined for a specific benefit

Primary Business Benefits with RSM

- Derived as a direct result of the implementation or improvement of a CMMI Process Area
- Table of primary business benefits associated with CMMI Process Areas presented in McLoughlin *

PA Identifier	Staged Level	Process Area	Expected Primary IGSI ROI Benefits
[2-1]	2 - Managed	REQM	4-2, 4-4, 5-2
[2,2]		PP	3-3, 3-4, 3-5, 4-1, 4-2, 4-3, 4-4
[2-3]		PMC	3-3, 3-4, 4-1, 4-2, 4-3
[2-4]		SAM	3-4, 4-1, 4-2, 5-2
[2-5]		MA	3-4, 4-1, 4-2, 5-2
[2-6]		PPQA	3-4, 4-1, 4-2, 5-2, 7-1
[2-7]		CM	4-1, 4-2, 6-3
[3-1]	3 - Defined	RD	4-1, 4-2, 4-4, 5-2

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Continuous Process Improvement Cycle

- Initiate Improvement Activity
 - **Identify organization's business goals** (1)
 - Define Medium/Long-term Strategic Improvement Plan (SIP)
- Conduct Internal CMMI Appraisal (Class B) to identify weaknesses
- Develop Process Improvement Plan
 - Prioritize process improvement activities using organization's business goal(s):
 - **Map organization business goal(s) to IGSI-ISM business benefit(s)** (2)
 - **Use GQM approach to define business metrics for each goal *** (3)
 - **Identify associated CMMI process areas using Rosetta Stone Model, and prioritize SPI activities to address those weaknesses accordingly** (4)
- Implement Process Improvement Plan
- **Monitor Business Metrics** (5)
- Re-initiate Improvement Activity



** Need to capture baseline measure values now, if you don't already have them*

Summary of CMMI Internal Appraisal Findings

Practice	PP	PMC	SAM	REQM	RD	TS	VER	VAL	CM	PPQA	MA
	Project Management			Engineering					Support		
SG 1											
SP 1.1	Yellow	Yellow	Green	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Green	Green
SP 1.2	Yellow	Red	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Red	Green
SP 1.3	Yellow	Red	Green	Yellow	Grey	Grey	Yellow	Yellow	Yellow	Grey	Green
SP 1.4	Yellow	Yellow	Grey	Red	Grey	Grey	Grey	Grey	Grey	Grey	Green
SP 1.5	Grey	Yellow	Grey	Yellow	Grey	Grey	Grey	Grey	Grey	Grey	Grey
SP 1.6	Grey	Yellow	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
SP 1.7	Grey	Yellow	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
SG 2											
SP 2.1	Yellow	Yellow	Green	Grey	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow
SP 2.2	Red	Yellow	Red	Grey	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow
SP 2.3	Yellow	Yellow	Green	Grey	Yellow	Yellow	Red	Grey	Grey	Grey	Green
SP 2.4	Yellow	Grey	Green	Grey	Grey	Yellow	Grey	Grey	Grey	Grey	Yellow
SP 2.5	Green	Grey	Green	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
SP 2.6	Yellow	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
SP 2.7	Yellow	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
SG3											
SP 3.1	Yellow	Grey	Grey	Grey	Yellow	Green	Yellow	Grey	Yellow	Grey	Grey
SP 3.2	Red	Grey	Grey	Grey	Yellow	Yellow	Yellow	Grey	Red	Grey	Grey
SP 3.3	Yellow	Grey	Grey	Grey	Yellow	Grey	Grey	Grey	Grey	Grey	Grey
SP 3.4	Grey	Grey	Grey	Grey	Yellow	Grey	Grey	Grey	Grey	Grey	Grey
SP 3.5	Grey	Grey	Grey	Grey	Yellow	Grey	Grey	Grey	Grey	Grey	Grey
GG 2											
GP 2.1	Green	Green	Yellow	Green	Green	Green	Green	Green	Green	Green	Yellow
GP 2.2	Yellow	Yellow	Red	Yellow	Yellow	Green	Yellow	Yellow	Green	Red	Yellow
GP 2.3	Yellow	Yellow	Yellow	Green	Green	Purple	Red	Red	Yellow	Red	Yellow
GP 2.4	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GP 2.5	Yellow	Red	Yellow	Red	Red	Purple	Yellow	Yellow	Red	Yellow	Red
GP 2.6	Yellow	Yellow	Green	Red	Red	Green	Yellow	Yellow	Green	Green	Yellow
GP 2.7	Yellow	Yellow	Green	Green	Green	Green	Yellow	Yellow	Green	Red	Red
GP 2.8	Red	Red	Red	Yellow	Red	Yellow	Yellow	Yellow	Red	Red	Red
GP 2.9	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
GP 2.10	Red	Red	Red	Red	Red	Purple	Red	Red	Red	Yellow	Red



GQM (Goal – Question – Metric) Definitions

- Define major **Goals** of the process improvement activity



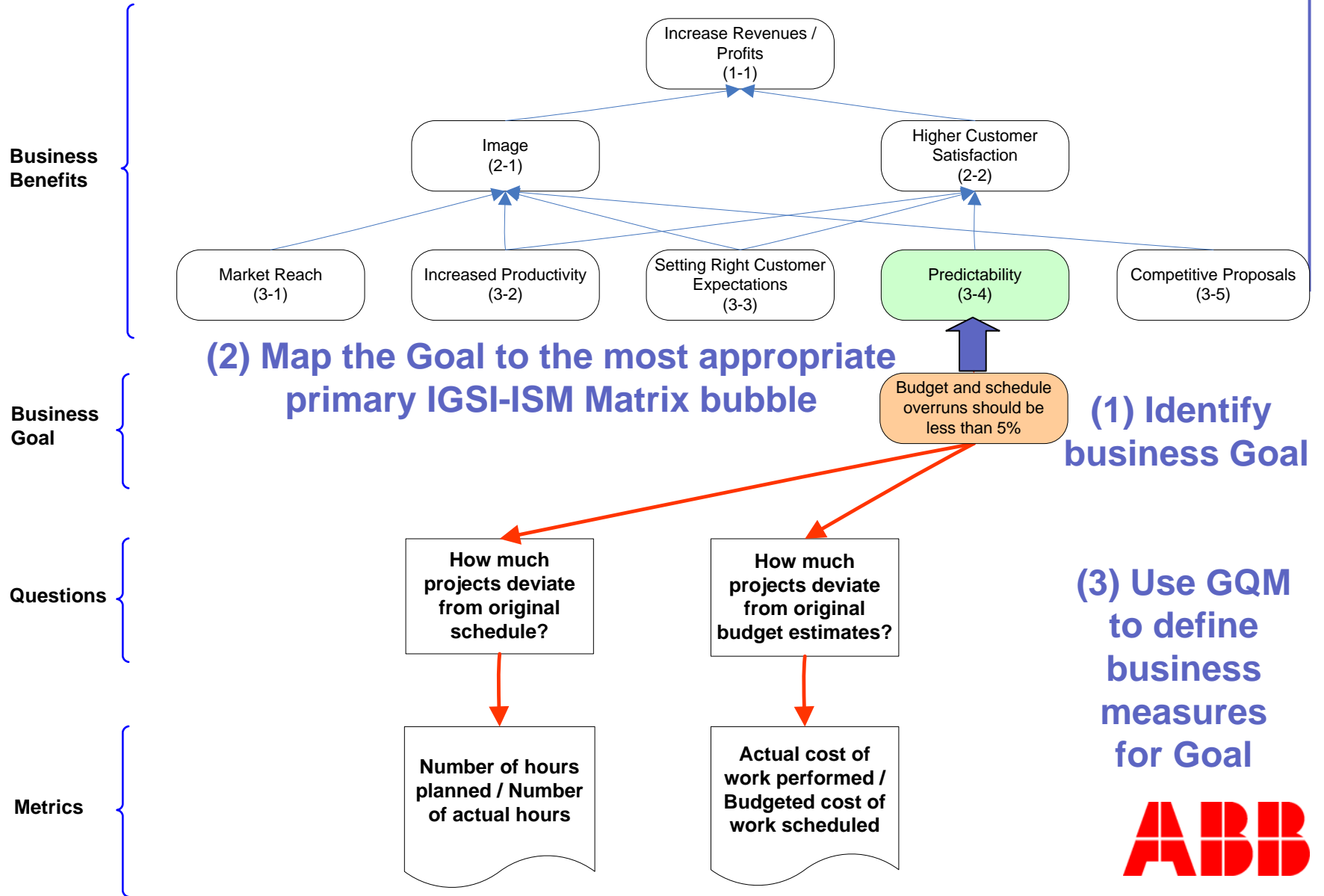
- Derive from the Goals the **Questions** that must be answered to determine if the Goals are achieved



- Identify **Measurements** that provide the most appropriate information for answering the Questions



RSM / GQM Example for Process Measurement



RSM Example: Improving Predictability

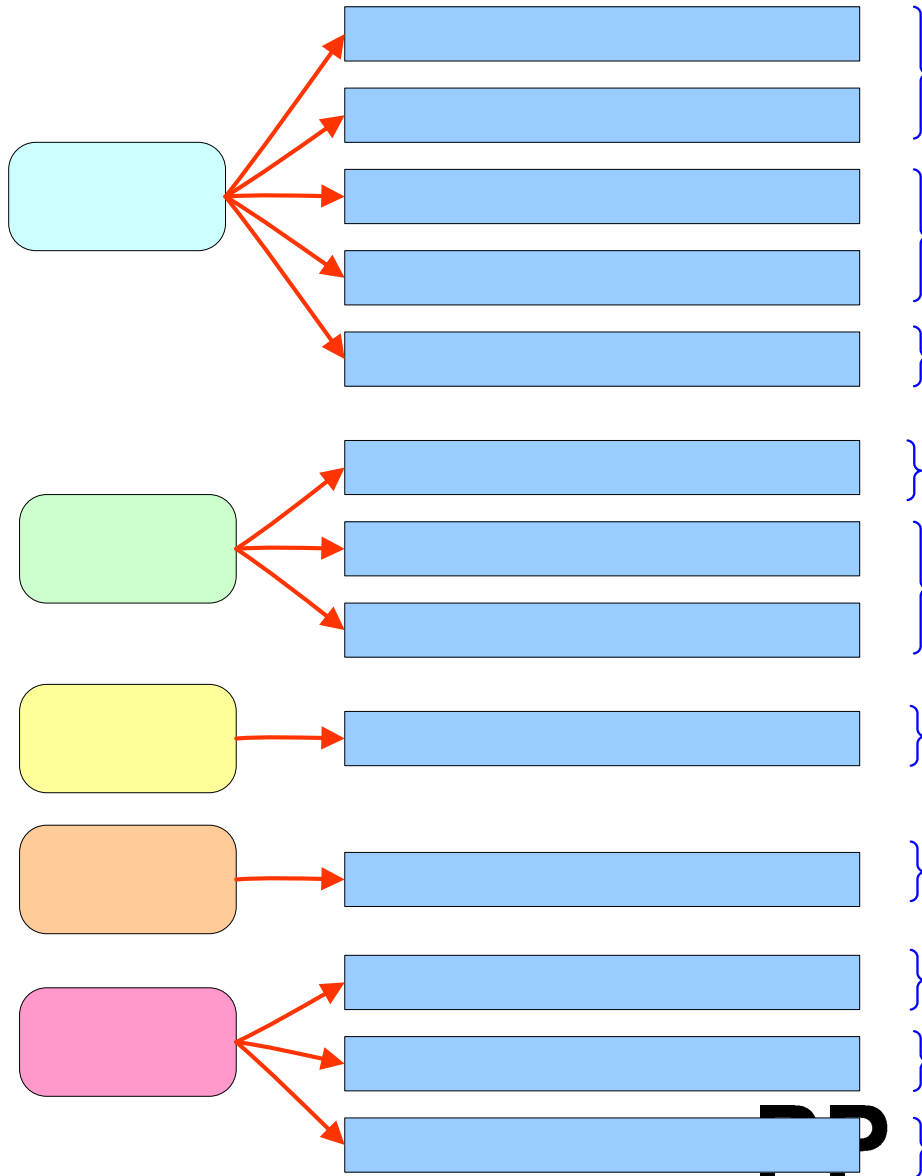
- Business goal of bringing cost and schedule overruns below 5% → **Predictability (3-4)** Business Goal/Benefit
- Which Maturity Level 2 CMMI Process Areas are affected by Predictability (3-4), in the Rosetta Stone Matrix? (4)

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- What weaknesses were found in these RSM-identified process areas by the CMMI Internal Appraisal?



Graphical Representation of Weaknesses



Measures from GQM:

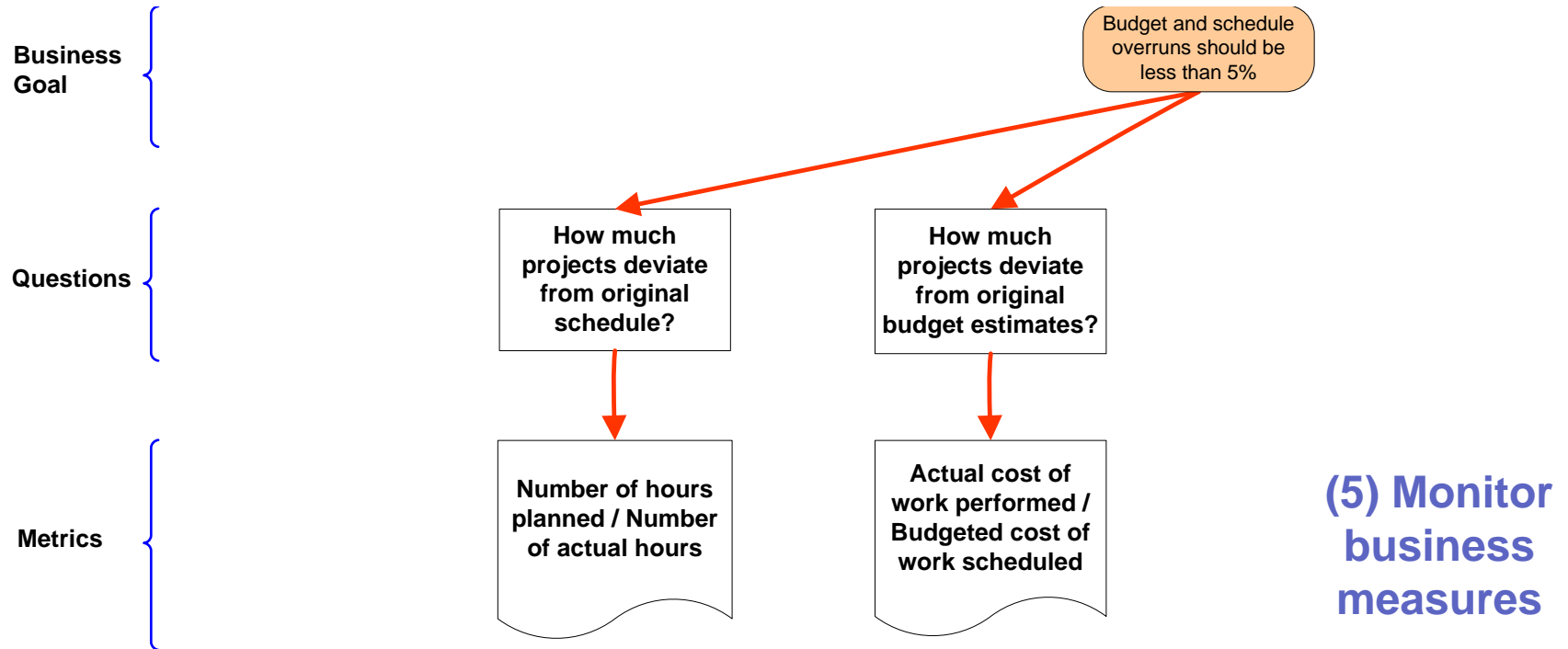
Number of hours
planned / number of
actual hours

Actual cost of work
performed / Budgeted
cost of work
scheduled

Work break
inconsistent
Estimates
historical c



RSM - Monitoring Predictability Improvement



The changes in the values in the business measures clearly show the business benefits of the process improvement activities which address these weaknesses.



Discussion

- Rosetta Stone Model approach is a good guide for business-driven SPI
- GQM approach is useful to define metrics associated with business benefits in Rosetta Stone Model
- If further level of prioritization granularity is required, weaknesses can be viewed under the Specific Goals magnifying glass



Questions?



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