



# Measuring Institutionalization

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## Agenda

- Core Issues
- Needs
- Measuring Framework
  - By Process
  - By Organizational Unit
  - Organization Wide
- Experiences
- Futures
- Summary



## About the Presenter

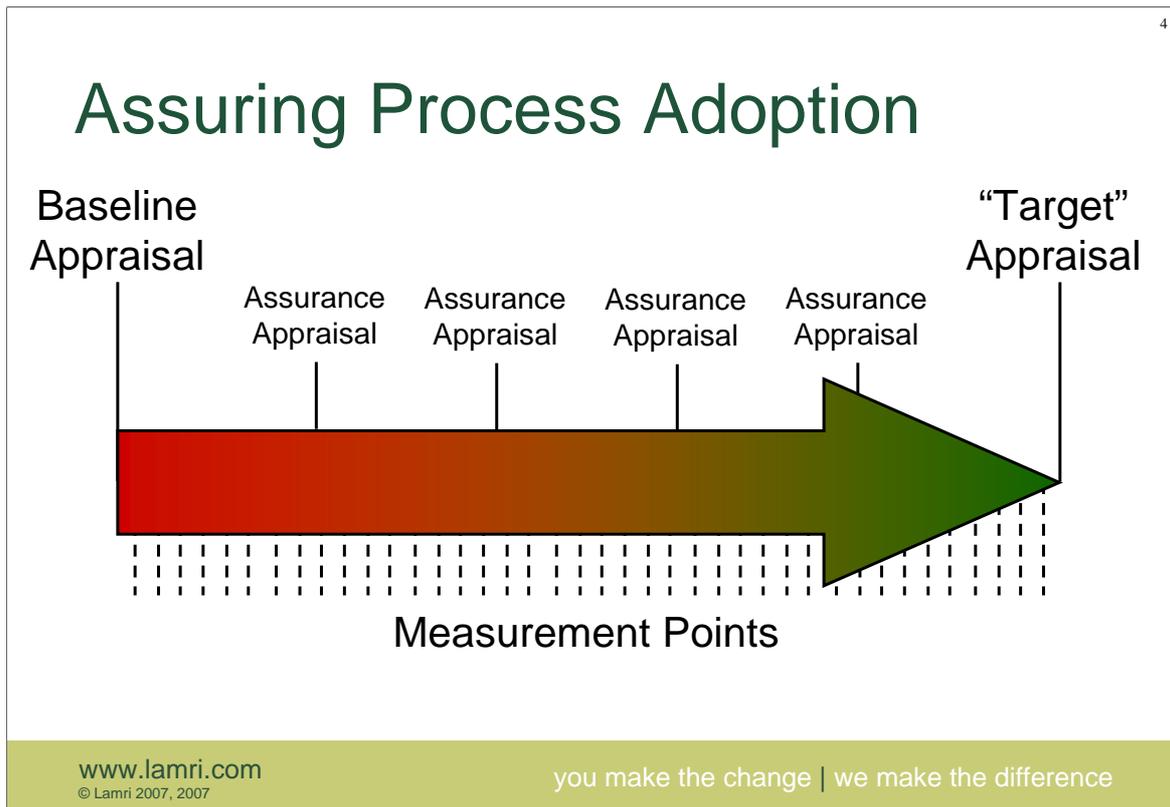
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### Assuring Process Adoption

Process adoption has traditionally been assured through a programme of appraisals, typically using SCAMPI. The first appraisal establishes the baseline against which process improvement is prioritized and implemented; the “target” appraisal measures the improvement. If a formal SCAMPI A is completed, the result is a maturity level for the organization or an achievement profile showing capability in each appraised process area.

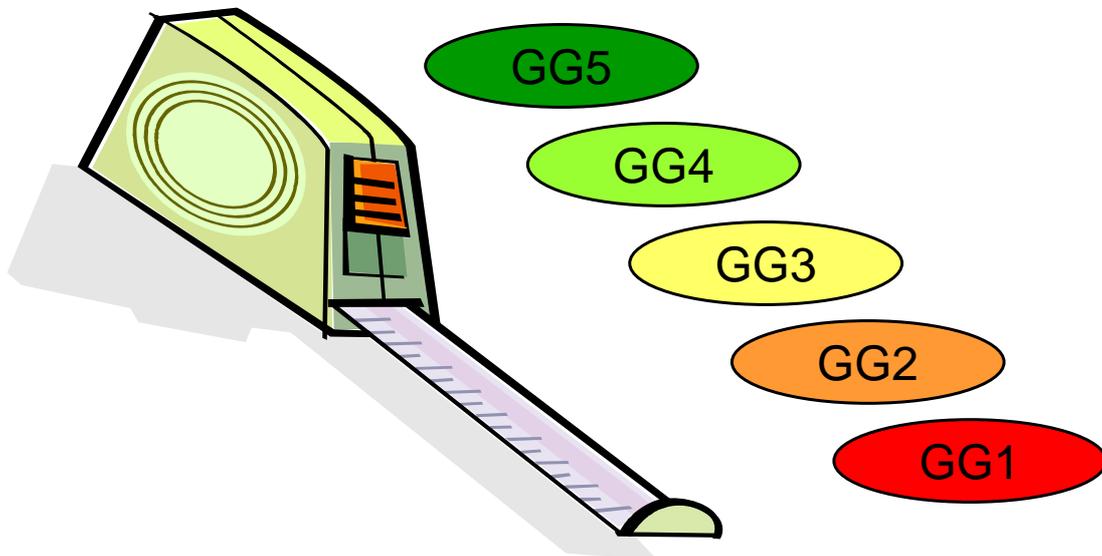
To offer some assurance that improvement goals are being met, many organizations instigate a series of “assurance” appraisals (SCAMPI B or C appraisals). The issue for many organizations is the cost and effort involved in undertaking such intensive items of work. This severely limits the number of “assurance” appraisals that an organization will be willing to undertake.

Even with a programme of “assurance” appraisals there are still questions such as:

- how are we doing between appraisals?
- how evenly spread is our adoption effort?
- are we achieving institutionalization?

The need is to ensure institutionalization by measuring as we go. This type of measurement helps to provide lightweight, continuous assurance that the objectives of the organization are being met and that their targets are realistic.

## Institutionalization in the Model



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### Alignment to the CMMI Model

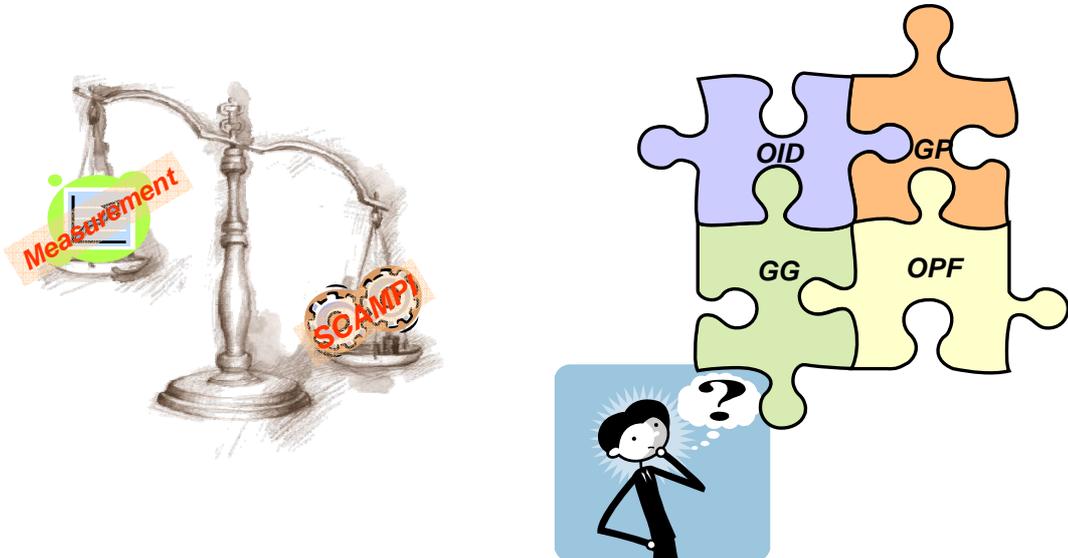
The key objective of the measurement framework is to provide measurement against the elements of the CMMI model that describe institutionalization – the Generic Goals and Generic Practices in each of the process areas. The measurement framework seeks to measure the progress made by the organization in implementing the generic practices as described in section 2 of the model, supplemented by the elaborations in each process area.

Even though the Generic goals and practices are treated differently in the two representations of the model, the structure of the measurement framework can remain unchanged. What will change is the measurement scale chosen by the organization.

Within a chosen representation, the measurement scale will change as the organization increases in maturity or capability. Each generic goal adds new practices and thus new points on the measurement scale to be implemented and measured within the overall framework.

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## Core Issue – Continuous Measures



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### Core Issue – Continuous Measurement

Measuring the level of institutionalization is a core issue for many organizations undertaking process improvement. Institutionalization is an expression of how well the organization has adopted the process – is the process business as usual? – is it just the way we work?

Part of the purpose of appraisal processes, including SCAMPI which is such a vital part of CMMI, is to help judge the level of institutionalization of processes within an organization. A significant part of the CMMI model itself – the generic goals and practices – is also focused on the concept of institutionalization. Key process areas including Organizational Innovation and Deployment (OID) and Organizational Process Focus (OPF) also emphasize the importance of the methods used to deploy and institutionalize processes.

Given the level of abstraction in which the CMMI model is framed, none of these elements describes effective mechanisms for measuring institutionalization that can be readily adopted. The SCAMPI process is too costly, takes too long and involves too much effort to be used as an effective measurement tool – rather it provides a checkpoint mechanism for measuring institutionalization (as a side effect of appraising maturity) at well defined but relatively infrequent milestones.

The generic practices and the OID and OPF process areas provide abstract, practice-based descriptions of how processes can be institutionalized. Being an abstract description there is no concrete implementable advice about how progress with institutionalization can be measured.

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## Core Issue – Low Maturity Measures

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### Core Issue – Low Maturity Measurement

Organizations that are just getting started with process improvement are most likely to be low on the scale of maturity or capability. This typically means that the idea of measurement will not be well developed. Immature organizations face the challenge of being able to measure institutionalization without the in-built capability to effectively perform measurement activities.

In the staged representation, we know that Measurement and Analysis (MA) is one of the process areas that must be implemented at maturity level 2. In the continuous representation, GP2.8 imposes the need to measure processes in order to be appraised at capability level 2.

The measurement problem is made more challenging still for low maturity organizations because it is very likely that they also lack a true organizational focus. Whilst many organizations choose to implement elements of OPF and Organizational Process Definition (OPD) early in their process improvement efforts, it is unlikely these will be as effective as in more mature organizations.

Consequently, organizations are not just faced with the challenge of measurement, the number of discrete measurements that are required will often be increased by the lack of organizational focus. There will be a relatively large number of process instances or variations and these will be widely distributed across the organization.

Even in organizations working at higher levels of maturity or capability, measurement of institutionalization can be a challenge because of the extended timescales over which monitoring and measurement have to occur. Institutionalization is not a short-term activity, but can occur over an extended period.

# Measurement Needs



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## Measurement Needs

Given the issues of providing practical measures of institutionalization, over extended periods of time in organizations that will often be immature and unused to the concept of measurement, we can identify the following needs:

### Simplicity

- Low effort – frequency and volume of information
- Easy to understand – concepts communicated rapidly
- Easy to communicate results – avoid excessive analysis
- Quick to train – large numbers of staff involved

### Fine Granularity

- Small steps for institutionalization – see progress early
- Progress shown over extended timescales – long term institutionalization
- Frequent review and update – to meet reporting cycles

### Staged

- Clear targets – prediction of success is easy
- Exceptions easy to spot – target effort to correct
- Snapshots of progress – understand success as it happens
- Easy to communicate progress – against staged targets

### Highly Automated

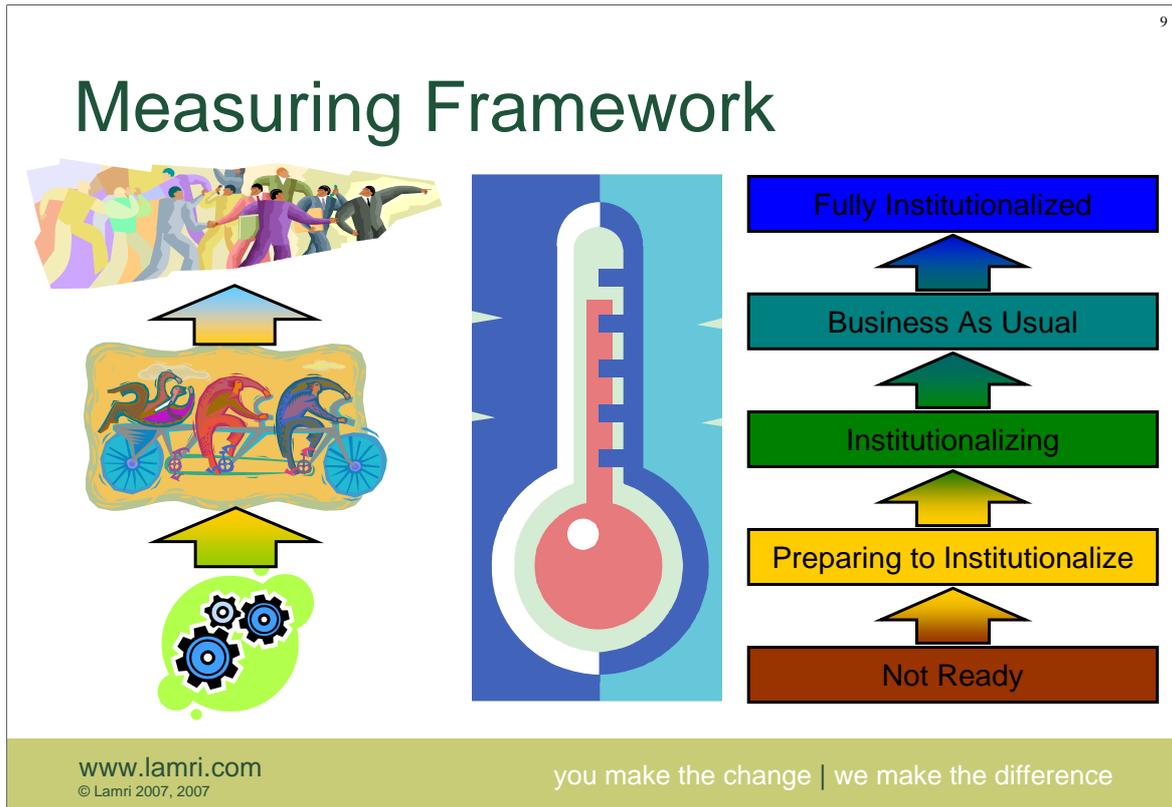
- Ease of maintenance – frequency and volume of information
- Regularity of updates – progress “in real time”
- Ease of reporting – avoid excessive analysis
- Control and integrity – build confidence in delivery and outcome

### Scheduled

- Targeted deadlines – when as well as what
- Phasing by process – monitoring at the appropriate level of granularity
- Phasing by organizational unit – monitoring at higher levels

### Reporting

- High-level summary for immediate impact – at a glance confidence builder
- Low overhead and easy publication – single webpage summary
- Confidence building on meeting targets – change is easy to see



## Measuring Framework

The framework for measuring institutionalization has been defined at three significant levels:

- Specific process instance (or process artefact) detail;
- Organizational unit scheduling;
- Organization wide reporting.

At the finest level of detail, processes instances or specific process artefacts are monitored according to their institutionalization “temperature”, reflecting the value-added by relatively small steps of institutionalization. This fine grained measurement is summarized and made more approachable by being reduced to a number of more coarsely grained institutionalization states:

### Not Ready

- Serves as a place-holder for the final steps of process definition and ensures that the process or process artefact is in a fit state to be institutionalized.

### Ready to Institutionalize

- The artefact itself may be ready to institutionalize, but other items which may assist the institutionalization are not complete – ensures that the framework within which institutionalization can occur is ready.

### Institutionalizing

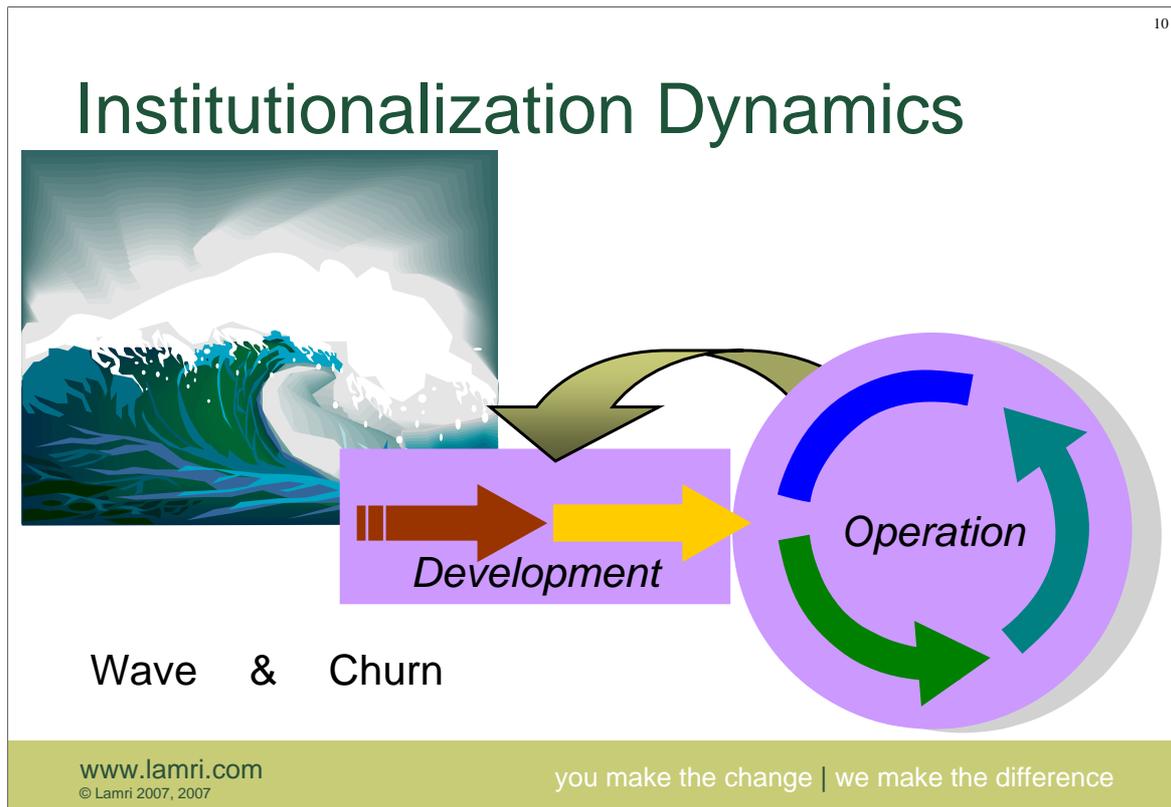
- Specific activities to institutionalize the process or artefact are performed according to a schedule controlled by the team using the process instance.

### Business As Usual

- The process instance is being operated by the organizational unit on a regular basis, long term assurance activities can be used to verify the process.

### Fully Institutionalized

- The process instance is being operated as business as usual and has been verified by long term assurance activities, any non-conformances have been corrected and process improvements are planned.



## Institutionalization Dynamics

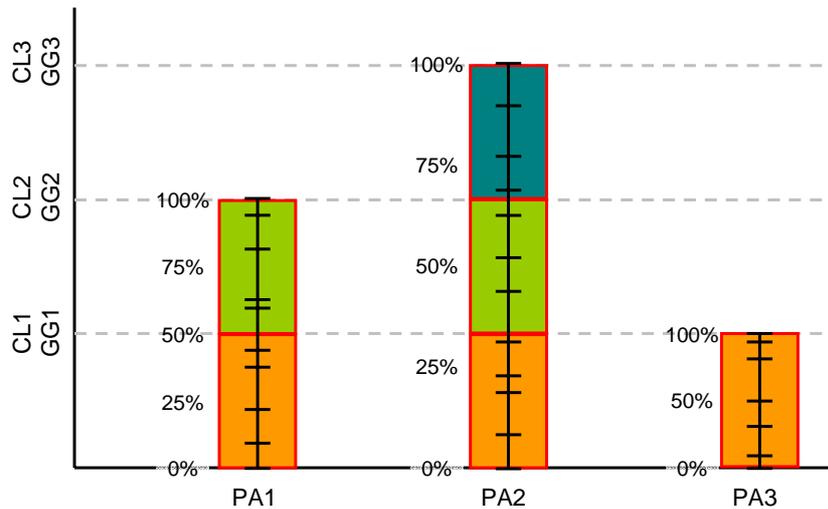
Institutionalization of a newly defined process is a lead-up to business as usual. As the CMMI model makes clear, once processes have been defined continuous process improvement becomes the norm. As a process is re-issued, it will revert to an earlier institutionalization state. Institutionalization activity will begin on the new version of the process, moving back to the later institutionalization states.

Typically organizations find two levels of institutionalization – wave and churn. Waves of institutionalization are encountered as the organization changes radically. Often this occurs when moving towards new levels of maturity, but may also occur when organizations merge, for example. Churn is the steady state of institutionalization, processes are improved and this steady turnover of processes results in a continuous flow of institutionalization activity.

The long term equilibrium is not a steady state, rather it is a cycle between the different states of institutionalization as processes are used, improved and then re-institutionalized. Paths around this cycle may become quite complex as later improvements may actually overtake the institutionalization cycle. If the improvement cycle becomes too fast, the organization faces a risk of too much churn in its processes, preventing full institutionalization and full experience of the processes. Lessons may not be interpreted appropriately leading to a worsening of process performance rather than improvement.

The measurement of institutionalization provides a control mechanism for the speed with which process improvement initiatives are launched and executed for the different processes. An organization may choose a simple control such as a new process version may not be issued until the current version has achieved Business As Usual (or some other defined target).

# Continuous Representation



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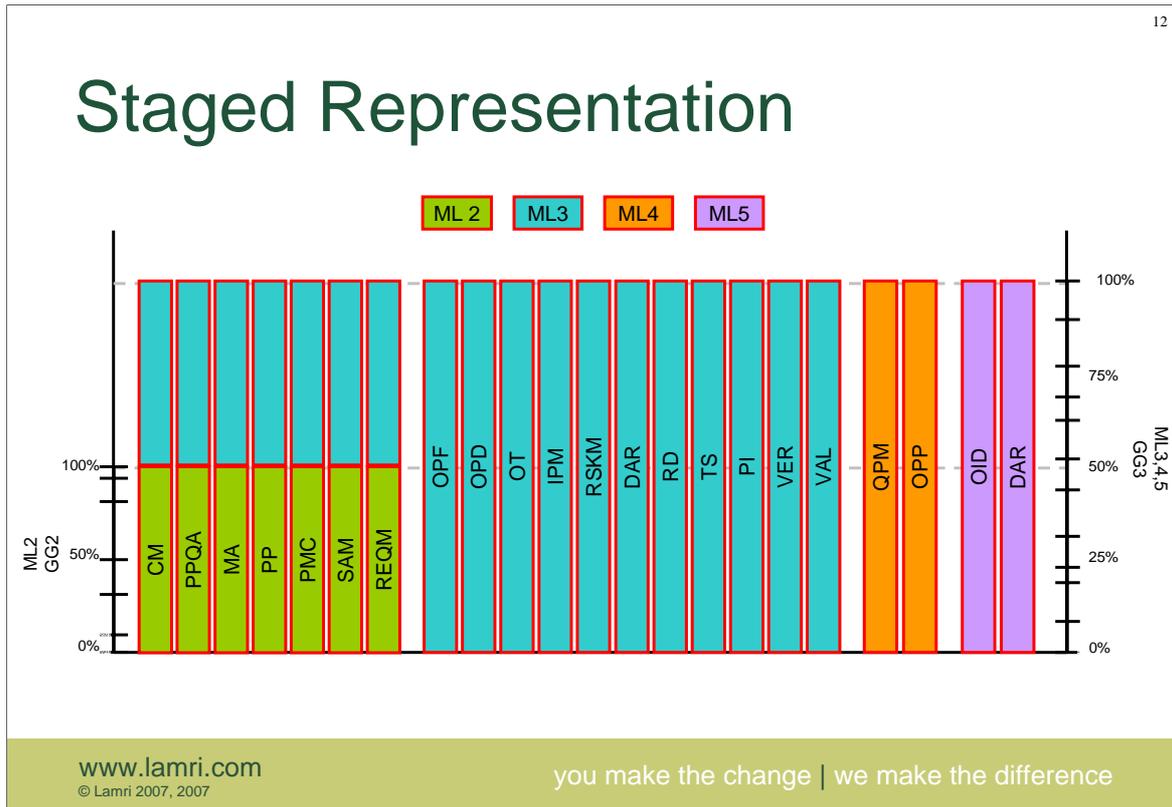
## Continuous Representation

The continuous representation allows organizations to choose the process areas they wish to improve in and to target a different capability level in each process area. The measurement framework must be capable of supporting this level of variation.

If two process areas are targeted at the same capability level, they will typically share a measurement scale within the framework. The objective of the framework is to measure institutionalization – the generic practices rather than the specific practices of a process area. As the targeted capability level is increased, the new generic goal introduces new generic practices. Each new generic practice adds new points to the measurement scale.

An increase in capability does **not** require additional process areas to be introduced. The number of specific measurement points captured within the framework increases with the targeted capability level even if the number of process areas is unchanged.





## Staged Representation

The staged representation maps groups of process areas onto each level of maturity. In addition, generic goals 2 and 3 are used to measure the institutionalization of process areas via managed and defined processes.

As each new level of maturity is achieved, the number of generic practices does not increase substantially (generic goal 3 adds 2 additional generic practices). The measurement scale is the same across all process areas being institutionalized. Measurement points related to generic goal 3 will be added on to the measurement scale if maturity level 3 or greater is being targeted.

The chosen maturity level dictates the set of process areas to be institutionalized. This will serve to increase the number of specific measurement points captured because each defined process must be measured for institutionalization.

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# Process Instance Detail

Not Ready				
	Checklist Item		Value Add	Comments
	Document has a review schedule	Y	0%	
	Document has been formally reviewed and published	Y	0%	
	Document is under configuration control	Y	0%	
Preparing				
	Appropriate training material has been approved by relevant stakeholders	Y	8%	
	Suitable direct and indirect evidence has been described	Y	5%	
	An audit has been booked	Y	2%	
Institutionalizing				
	Appropriate training has been completed and recorded	Y	15%	
	Specified direct evidence exists and has been referenced	Y	10%	
	Specified indirect evidence exists and has been referenced	Y	8%	
	Improvement suggestions have been elicited	Y	4%	
	An audit has been carried out	Y	15%	
Business as Usual				
	First scheduled review has taken place	N	8%	
	Audit validated with any non-conformances closed	N	15%	
	Suggested improvements agreed and implemented	N	10%	
Fully Institutionalized				
	Status		Total	
	Institutionalizing		52%	

## Process Instance Detail

Process instance is the finest level of measurement within the framework and shows the institutionalization status of a single process instance – a single process within one organizational unit. To meet the critical need of simplicity, each process instance is monitored using a checklist of simple questions. Each question:

- requires only a yes/no answer;
- is provided with guidance notes to help the information provider;
- contributes to the achievement of a specific institutionalization status;
- contributes to the value-added measurement of institutionalization;
- typically relates to a generic practice;
- may relate to other questions associated with other status levels.

Progress is achieved by indicating that the goal set by a question has been achieved (answering “yes” to the question).

Each question answered adds its contribution to the value-added “temperature”. If all questions relating to an institutionalization state are answered, the process is considered to have started the next stage of institutionalization.

Not everything that is to be institutionalized need be a process. At low levels of maturity or capability, processes may be replaced by plans, policies and strategies which together provide the implementation of the specific and generic practices in the process area. In consequence, process related questions may not be appropriate too all the artefacts requiring institutionalization.

The framework does not define a fixed list of questions – not even the number of questions in the checklist need be fixed across all artefacts.

# Organizational Unit Schedule

<b>Team</b>		Front Office Build		<b>Last Review</b> 17 Mar 2007		<b>Target</b> 65%					
<b>Baseline Date</b>		24 Feb 2007		<b>Owner</b> FB		<b>Date</b> 07 Apr 2007					
Process Name		Responsibility	Baseline	Current Status	Verification	Baseline Reviews					
						03 Mar 2007	10 Mar 2007	17 Mar 2007	24 Mar 2007	31 Mar 2007	07 Apr 2007
Change Control		AR	17 Mar 2007	52%	05 Mar 2007	17 Mar 2007	17 Mar 2007	24 Mar 2007			
Configuration Management		BB	31 Mar 2007	35%	24 Feb 2007	31 Mar 2007	31 Mar 2007	31 Mar 2007			
Project Planning		TS	24 Mar 2007	28%	04 Mar 2007	24 Mar 2007	28 Mar 2007	28 Mar 2007			
Project Management		TS	24 Mar 2007	0%	01 Mar 2007	07 Apr 2007	07 Apr 2007	28 Apr 2007			
Quality Assurance		GL	10 Mar 2007	72%	10 Mar 2007	10 Mar 2007	10 Mar 2007	10 Mar 2007			
			Temperature	37%							

## Organizational Unit Schedule

The organizational unit summary shows the institutionalization of all processes within an organizational unit. All processes are considered equal, without any concept of different weighting of progress by process. The summary provides a very simple, visible overview of the progress of institutionalization within the organizational unit.

Most importantly, the summary provides support for the scheduling of institutionalization within the organizational unit. The scheduling is high-level, allowing progress to be monitored for processes against a specific target level of institutionalization. Scheduling is supported by the definition of a target date by which the specified level of institutionalization for each process must be achieved. This date can be monitored against an overall target date set for the wider organization.

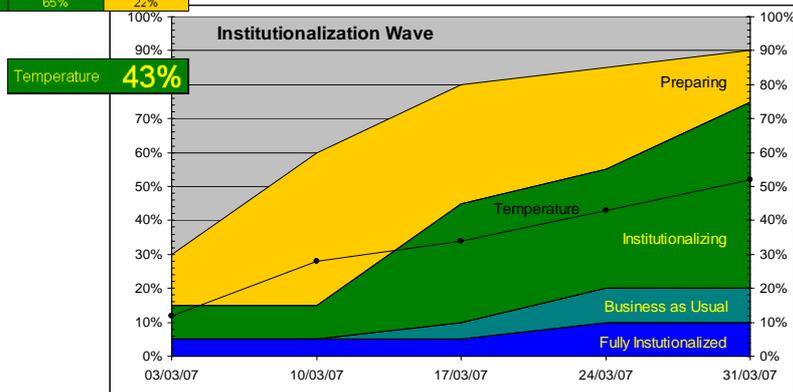
Choice of institutionalization target combines both the targeted state and the value-added score – for example “Embedding + 65%”. The institutionalization state requires that all earlier stages of institutionalization are completed – all questions are answered positively. Specifying a value-added score imposes a minimum level of institutionalization that must be achieved, but does not necessarily imply a fixed set of questions being answered – in other words progress towards institutionalization can vary by process.

Scheduling within the summary is deliberately kept very simple. A key assumption is that there are no important dependencies between the processes to be institutionalized. Within the overall target for institutionalization, the responsible part of the organizational unit is left to plan its own institutionalization project for each process. Such a detailed plan should feature tasks that will ensure the questions can be answered affirmatively within the permitted timescale.

# Organization Wide Reporting

	Front Office Build	Back Office Build	Business Change	Technical Architecture
Change Control	52%	47%	57%	82%
Requirements Management			95%	
Configuration Management	35%	68%	25%	75%
Project Planning	28%	0%		37%
Architecture Verification		32%		
Project Management	0%	17%		0%
Quality Assurance	72%	52%	65%	22%

Not Ready	3
Preparing	6
Institutionalizing	7
Business As Usual	2
Fully Institutionalized	2
Total	20



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## Organization Wide Reporting

The institutionalization framework is completed by a high-level reporting capability that summarizes progress across all processes and organizational units. The most detailed report is a “skyline” chart showing the state and value-add achieved for each process in each organizational unit. If a process is out of scope for an organizational unit then the cell in the skyline chart is not applicable.

From this relatively detailed report, higher levels of report can be abstracted. Progress with institutionalization state can be reported on a regular basis in different forms. A bar chart shows the number of processes in each state and by being compared side-by-side can show the momentum of the institutionalization activity. The same information can be presented in cumulative area chart – referred to as the “Institutionalization Wave”.

The institutionalization thermometer presents the most abstract level of report. This is a single colour and score combination. The single colour aspect gives the median institutionalization state across the organization. The score gives the average institutionalization value-add across the entire organization.

Currently organization wide reporting excludes any reporting against the schedule. However, since the information is available within the framework, this information could easily be included.

# Setup Experiences

	Checklist Item		Value Add	Comments
Not Ready	Document has a review schedule	Y	0%	
	Document has been formally reviewed and published	Y	0%	
	Document is under configuration control	Y	0%	
Preparing	Appropriate training material has been approved by relevant stakeholders	Y	8%	
	Suitable direct and indirect evidence has been described	Y	5%	
	An audit has been booked	Y	2%	
Institutionalizing	Appropriate training has been completed and recorded	Y	15%	
	Specified direct evidence exists and has been referenced	Y	10%	
	Specified indirect evidence exists and has been referenced	Y	8%	
	Improvement suggestions have been elicited	Y	4%	
	An audit has been carried out	Y	15%	
Business as Usual	First scheduled review has taken place	N	8%	
	Audit validated with any non-conformances closed	N	15%	
	Suggested improvements agreed and implemented	N	10%	
Fully Institutionalized	Status		Total	
	Institutionalizing		52%	

States Value-Add Questions

## Setup Experiences

**Choice of institutionalization states** is critical to the success of the framework. If too few states are selected then even significant progress may not show in a change of state – hiding important progress. Too many states will show significant progress for even small advances in institutionalization. Five states seems to balance a real sense of progress with real advances in institutionalization.

Naming of states is also important (and is made easier by choosing relatively few states). Names such as *Ready to Institutionalize*, *Business As Usual* and *Fully Institutionalized* give a clear indication of the institutionalization state of each process.

Similar considerations govern the **choice of value-add**. For example do questions relating to activity before institutionalization starts add value? What is the value-added by an audit being booked compared to an audit being carried out or non-compliances being resolved.

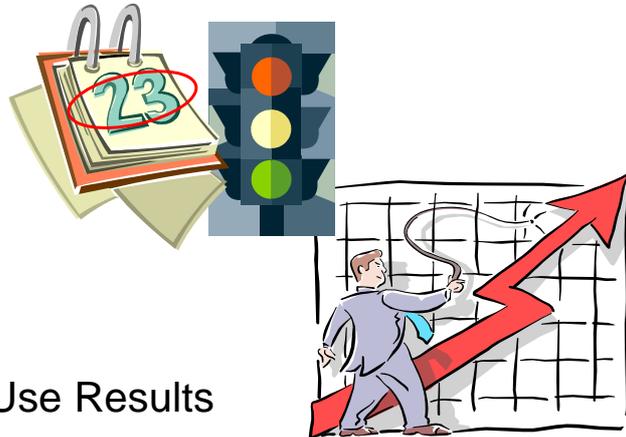
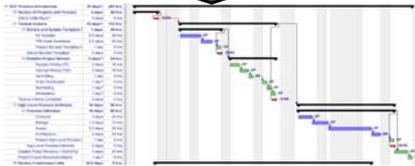
**Choice of questions** is also vitally important. Each question should represent a fine increment of progress and be capable of being answered with a simple *yes* or *no*. The set of questions together represents a checklist for assessing the institutionalization of a process. Even if the questions are kept simple, advice and guidance must be provided to assist in their interpretation for different processes and process artefacts.

# Monitoring Experiences

Team	From Office Build	Last Review	Target
Business Date	24 Feb 2007	17 Mar 2007	17 Apr 2007
Owner	PI		

Process Name	Responsibility	Baseline	Current Status	Verification	12 Mar 2007	13 Mar 2007	14 Mar 2007	15 Mar 2007	16 Mar 2007	17 Mar 2007	18 Mar 2007	19 Mar 2007	20 Mar 2007
Change Control	AC	17 Mar 2007	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Configuration Management	CC	17 Mar 2007	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Project Planning	PP	17 Mar 2007	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Project Management	PM	17 Mar 2007	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Quality Assurance	QA	17 Mar 2007	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Technical													



Delegate      Simplicity      Use Results

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## Monitoring Experiences

**Monitoring should be kept simple**, especially in low maturity or capability organizations. By delegating the detailed institutionalization task planning to the teams responsible for the process instance, monitoring focuses simply on the institutionalization state and value-added score. This information can be updated automatically from the detailed monitoring sheets.

**Schedule monitoring** is against the established baseline date for achieving the targeted level of institutionalization (state and value-add) for each process instance. Delivery dates may change and attain a RAG status as a result. Green dates are the same as (or earlier than) the baseline date. Amber dates are later than the baseline target, but still within the target of the wider organization as a whole. Red dates are outside the target set for the wider organization.

**Using the measurement results** is vital. Progress chasing is undertaken against the established target and baseline dates. While each team maintains their detailed schedule, the PI manager can monitor overall progress towards the target using the organizational unit summary.

As with any measurement, the evidence provided can be used to show where problems are arising and to identify the root causes of the issues. For example, progress beyond “institutionalizing” was obstructed by the inability of an organizational unit to undertake any additional quality audits. Processes had to wait for a scheduled audit in order to progress further – potentially a lengthy delay.

The evidence was used to persuade the manager of the organizational unit to expand the audit capability. Progress was still delayed, but future capability has been increased.

# Futures



Checklist Item	Value Add	Comments
Is it covered from 1. activities completed	Y	10%
Occurrence has been formally reviewed and controlled	Y	2%
Have control activities (management controls)	Y	1%
Supervisor/working methods has been supported by relevant methodology	Y	5%
Plausible direct and indirect evidence has been described	Y	2%
All work has been recorded	Y	2%
Supervised activities has been completed and recorded	Y	15%
Observed direct evidence similar to that being referenced	Y	10%
Significant indirect evidence exists and has been referenced	Y	5%
Improvement suggestions have been identified	Y	4%
All work has been controlled and	Y	15%
Checklist reviewed and been in place	Y	1%
All staff involved with long-term implementation activities	N	16%
Deployed improvements agreed and implemented	N	10%
<b>Status</b>		<b>Total</b>
reporting		52%



Reporting      Checklists      States

## Futures

The **monitoring framework** is a work in progress. Mechanisms for monitoring at the process instance level have remained stable from the beginning. In contrast, the reporting aspects of the framework have evolved over time to better meet the needs of the organization's senior management. The ability to respond quickly to new reporting needs is evidence for the appropriateness of the information being gathered.

Schedule monitoring and reporting could be made more elaborate, but there is little evidence that this would bring significant benefit.

The flexibility of the process instance checklist is being reviewed. Currently the same checklist is used for all process instances and process artefacts. This has resulted in an increase in the level of mentoring and guidance provided to the teams who are required to use the checklist. The questions require careful interpretation for non-process artefacts.

Providing variant checklists with different sets of questions and different degrees of value-add will simplify the use of the framework and reduce the level of mentoring required. To retain the consistency and integrity of the framework, all artefacts requiring institutionalization must pass through the same set of institutionalization states.

## Summary

- Building confidence in Process Improvement progress
  - Needed to measure progress towards appraisal readiness
  - SCAMPI is an *appraisal* method not a *monitoring* method
  - SCAMPI is costly, effort intensive and gives a single measurement point
  - CMMI model does not prescribe measurement of institutionalization
  - CMMI has *practices* to guide institutionalization (Generic Goals and Process Management PA)
- Fine-grained measurement points
  - By process and organizational unit
  - Fine steps of institutionalization
  - Ease and speed of use given large numbers of process instances
- Course-grained reporting steps
  - Progress is highly visible
  - Ease of reporting and summarization
- Continuous value-add
  - Process improvement is continuous – especially higher maturity/capability
  - Processes cycle between levels of institutionalization
  - Measurement of re-institutionalization helps control improvement initiatives

## Summary

Monitoring institutionalization is vital to building assurance that an organization will be successful in achieving its process improvement targets.

The SCAMPI method provides a snapshot of the level of maturity or capability, including level of institutionalization. However the process is expensive in time and effort – providing assurance in advance is important in building an organizations confidence in success.

To avoid the costs of the SCAMPI process, the monitoring framework must be lightweight and simple to use. It must provide fine grained measurement of individual steps towards institutionalization for each process instance or process artefact.

Specific institutionalization steps must aggregate to more coarsely-grained states, providing high-visibility of the overall progress at across entire organizational units are at even higher level.

Institutionalization is not a once-only event. Continuous process improvement means that processes will continually cycle between different institutionalization states.

# Thanks for listening... Questions?

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