



CMMI, Model Driven Testing and Capitalization



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Introduction

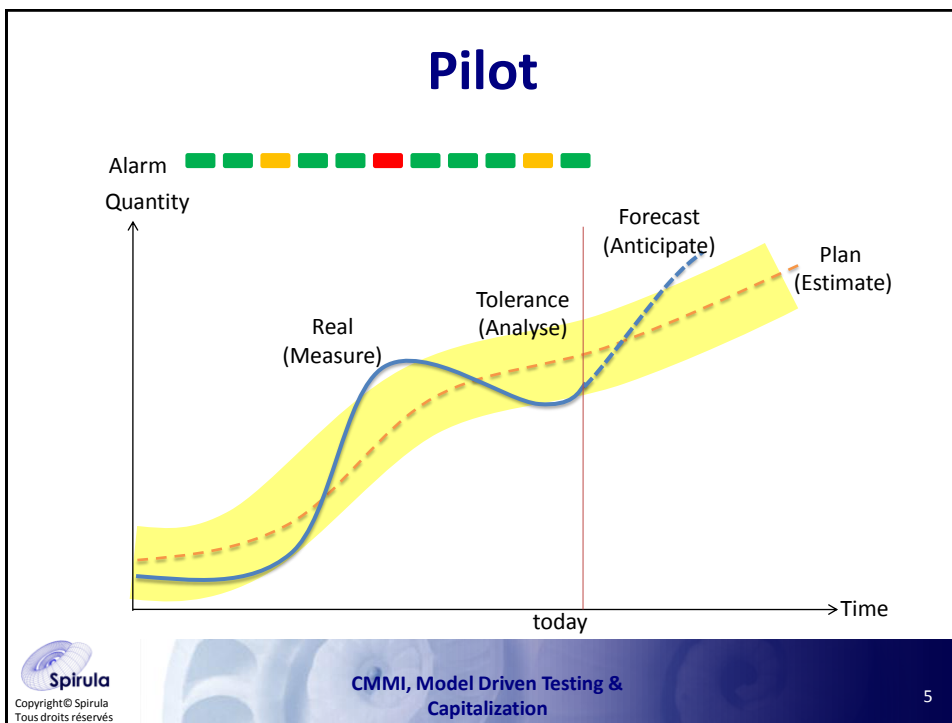
- Why are you here ?
- Timetable





Stakes

- Lack of visibility into the projects
- Poor accuracy in estimation
- Unused indicators
- Lack of historical information on previous projects which could be reused
- Too much Excel, not enough time to analyze reporting
- Inefficient development processes



Mission

Allow companies to
Measure their Projects by
proposing innovative solutions

To understand the past

To pilot the present

To predict the future

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Agenda

- 9h30 **Welcome and introduction**
- 10h00 **CMMI for managers**
What is CMMI ? For who? How much does it cost ? What is the ROI?...
- 11h00 **Break**
- 11h20 **Optimize testing through capitalization**
Measurement and Capitalization make it possible to define more efficient testing strategies.
- 12h20 **Lunch**
- 13h30 **Model Driven Testing with Conformiq Qtronic™**
How to gain time and money with model based testing.
- 15h00 **Break**
- 15h20 **Measurement & Capitalization - Demo DDE**
Demo DataDrill Express : plan the effort to be allocated to new campaigns using historical data
- 16h20 **Discussion**
- 17h00 **End**

CMMI for Managers

- Introduction – Stakes
- « IT » models
- CMMI
- Approach, assessments
- Change management
- Return of experience
- Conclusion




Stakes

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Standish Group

- The average cost is **145%** of the initial estimated cost
- The average period is **163 %** of the initial estimated period
- On average, only **67 %** of the specified functionalities is delivered

Rapport CHAOS



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Do you have these symptoms?

- Missed commitments
 - Spiraling costs
 - Late delivery to the market
 - Last-minute crunches
- Inadequate management visibility
 - Too many surprises
- Quality problems
 - Customer complaints
 - Too much rework
 - Functions not working correctly
- Poor morale
 - Burned-out people
 - Inadequate control of project results



This is common

- IT department is under pressure - requests are asking for :
 - More complex
 - More performance
 - Quicker
 - Cheaper
- New technologies make predictions difficult
- There is no « contract » between the customer and IT
 - The customer changes requirements without accepting the consequences
- Staff stressed
- A lot of knowledge is not formalized

What can you do?

- Nothing!
 - I like my problems
 - I prefer to live with them
 - I like to spent my money this way
- Try to solve the problems :
 - Understand the cause of the problem
 - Imagine a solution
 - Implement the solution

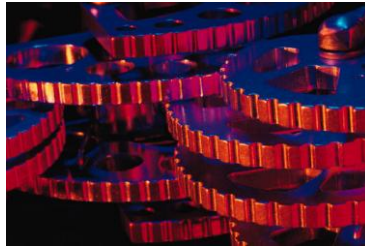


The different « IT » models

SEI CMMI, ISO 9000:2000, ITIL, COBIT, SPICE, ...

Why processes?

$$\text{Quality}_{\text{system}} = f(\text{Quality}_{\text{processes}})$$



How do you want to work?



OR

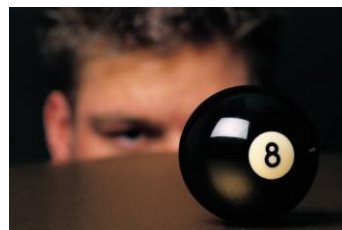


?

Common Fallacies

- I don't need processes, I have ...

- Really good people
- Advanced technology
- Experienced management



- Process ...

- interferes with creativity
- introduces bureaucracy and regimentation
- isn't needed when building prototypes
- is only useful on large projects
- hinders agility in fast-moving markets
- costs too much

Imagine ...

- You organize a conference with the worlds best system developers
- It is THE occasion to capture their best practices
- At the end of the conference, you wish to publish the results
- What do you intend to capture these skills?

Step n°1

Identify the business areas

- Project management
- Quality Assurance
- Requirement management
- ...

Step n°2

- Organize workshops per business area
- Identify, for each of them, the Best Practices

Workshop: Project Management

- A good process definition
- Clarify the scope of the project
- Subdivision of the projects in sub-projects
- Training
- A guideline
- Tools
- ...

Step n°3

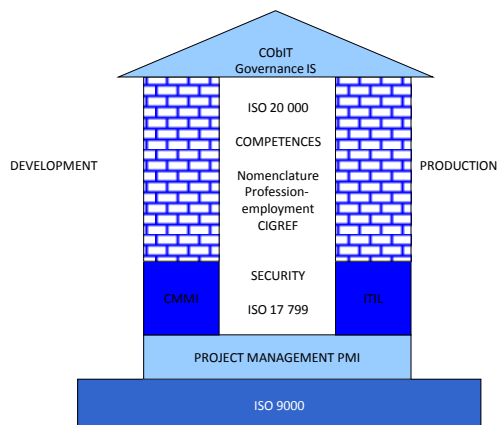
- Organize the practices in 2 categories :
 - The **generic practices**, for all business areas:
 - Establish Rules
 - Plan the process
 - Provide resources
 - Assign responsibilities
 - ...
 - The **specific practices** in each business area :
 - Requirement Management (Manage changes, Commit to requirements..)
 - Project planning (Determine the scope, Estimate...)
 - Project Monitoring and Control (analyze the difficulties, action plan..)
 - Quality Assurance (Process evaluation, Product evaluation..)
 - ...



**Congratulations, you just
re-invented CMMI...!**

Adapted repositories

- Project management
- Qualification
- Organization study
- MODA : Methods and Tools Of Application Development
- ITIL
- Quality Insurance function
- Establish a management quality system



Presentation of the CMMI model

Capability Maturity Model Integration (CMMISM)

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CMMI & Maturity

The staged model

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Level 1 : Initial

- Processes are not or poorly defined
- Success relies on key people
- Activities are not documented

In ⇄  ⇄ Out

- Reality is very different from estimates
- The time of the « heroes »
- Crisis management (delays)
- No capitalization of effort.

	Project Management	Engineering	Support	Process Management
Optimizing 5				
Quantitatively Managed 4				
Defined 3				
Managed 2	<div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Project planning</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Project Monitoring & Control</div> <div style="border: 1px solid black; padding: 2px;">Supplier agreement management</div>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Requirement management</div>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Measurement & Analysis</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Process & Product Quality Assurance</div> <div style="border: 1px solid black; padding: 2px;">Configuration management</div>	




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Level 2 : Managed

- Management processes are established (defined, diffused and applied)
- Projects are organized and achieved according to the plan




- Projects disciplined but heterogeneous
- Control of forecasts (measures) is implemented
- Processes are repeatable
- Estimates are more reliable
- The quality of life improves.



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	Project Management	Engineering	Support	Process Management
Optimizing 5				
Quantitatively Managed 4				
Defined 3	Integrated Project Management Risk Management	Requirement Development Technical Solution Product Integration Verification Validation	Decision Analysis & Resolution	Organizational Process Focus Organizational Process Definition Organizational Training
Managed 2	Project planning Project Monitoring & Control Supplier agreement management	Requirement management	Measurement & Analysis Process & Product Quality Assurance Configuration management	

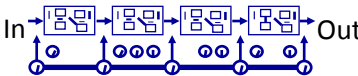


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Level 3 : Defined

- The processes are generalized to the entire organization and adapted by the projects
- The focus is on engineering processes



- Comparison between projects is possible
- We take into account the lessons of the past
- Capitalization
- Re-use



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VER - Verification

Check that products and intermediates correspond to their specifications.

Associated risks :

- Product does not meet the specification
- Method of verification non formalized
- Environment for verification not available



VAL - Validation


Demonstrate that the product has satisfied the purpose for which it is intended in its real environment.

Risks associated:

- Product not working in the target environment
- Problems emerge very late
- Validation conducted without established criteria, not reproducible for subsequent versions..



	Project Management	Engineering	Support	Process Management
Optimizing 5				
Quantitatively Managed 4	Quantitative Project Management			Organizational Process Performance
Defined 3	Integrated Project Management Risk Management	Requirement Development Technical Solution Product Integration Verification Validation	Decision Analysis & Resolution	Organizational Process Focus Organizational Process Definition Organizational Training
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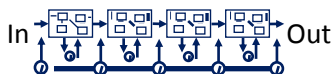
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Level 4 : Quantitatively Managed

- Validation conducted without established criteria, not reproducible for subsequent versions



- Feedbacks
- Measuring process improvement (quantitative and qualitative)

	Project Management	Engineering	Support	Process Management
Optimizing 5			Causal Analysis And Resolution	Organizational Innovation and Deployment
Quantitatively Managed 4	Quantitative Project Management			Organizational Process Performance
Defined 3	Integrated Project Management + IPPD Risk Management	Requirement Development Technical Solution Product Integration Verification Validation	Decision Analysis & Resolution	Organizational Process Focus Organizational Process Definition + IPPD Organizational Training
Managed 2	Project planning Project Monitoring & Control Supplier agreement management	Requirement management	Measurement & Analysis Process & Product Quality Assurance Configuration management	

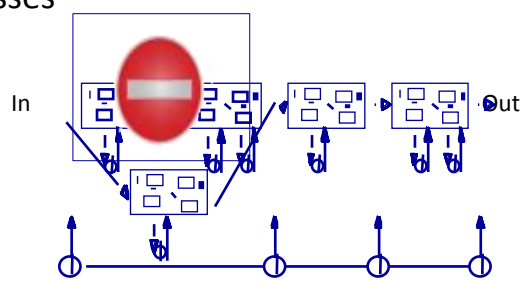
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Level 5 : Optimizing

- Maximum process control
- Measures used for the ongoing optimization of processes



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Attention

- The CMMI Best Practices tell you

What to Do

but

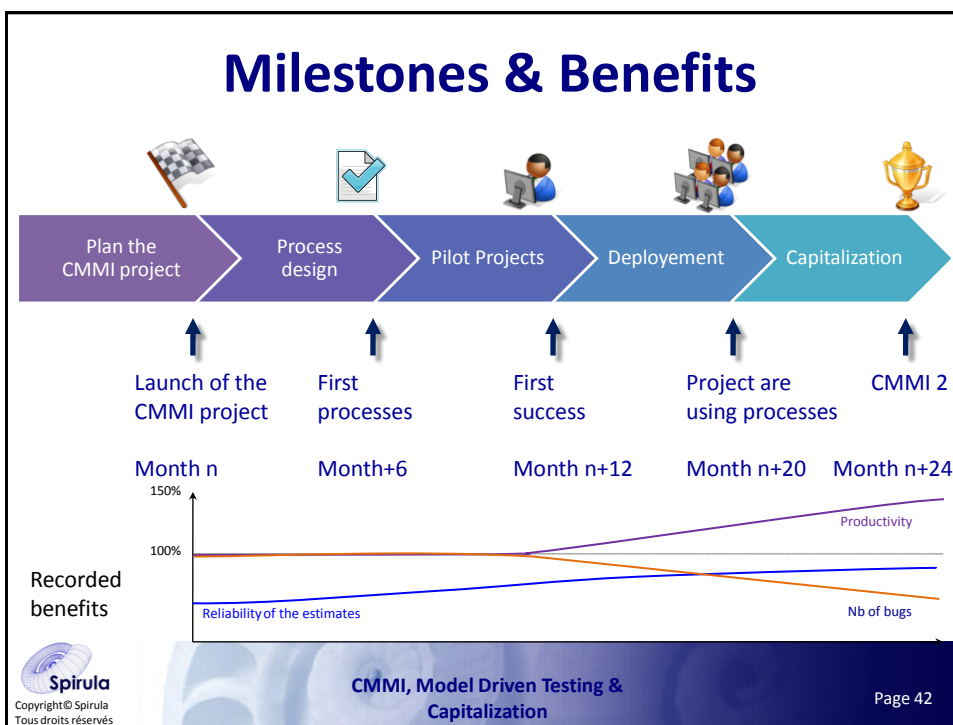
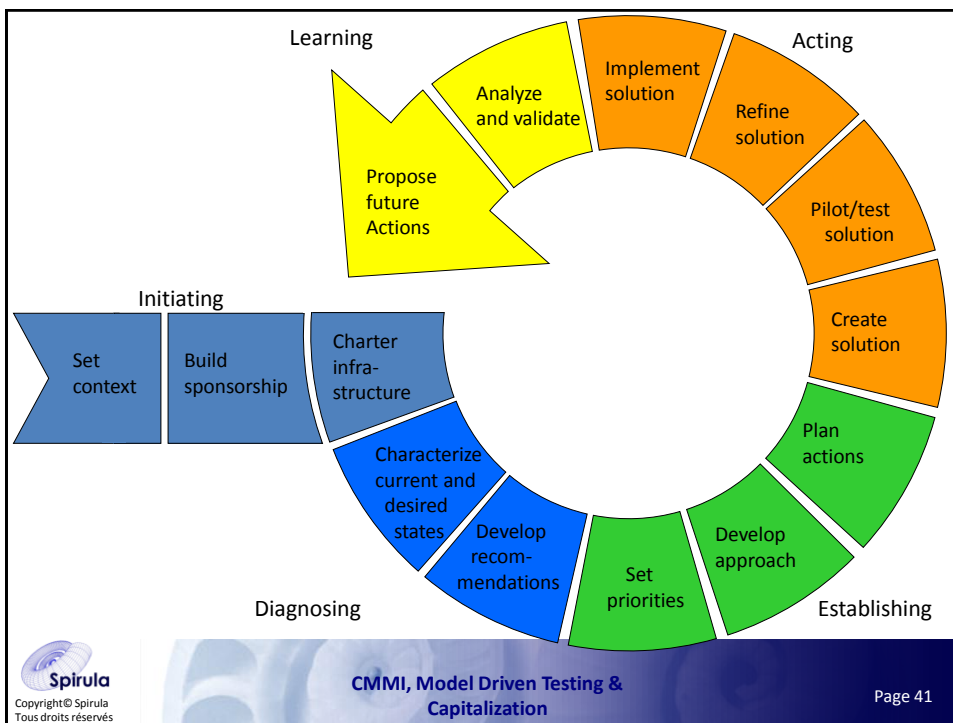
Not How to do it,


Nor Who has to do it



Approach and assesment

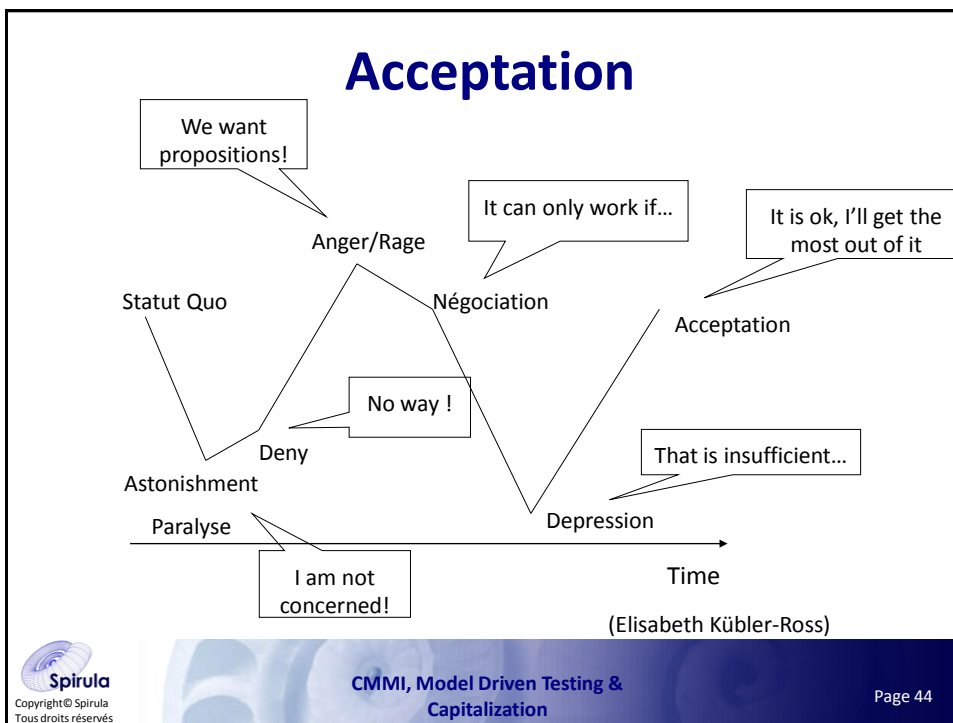
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Change Management

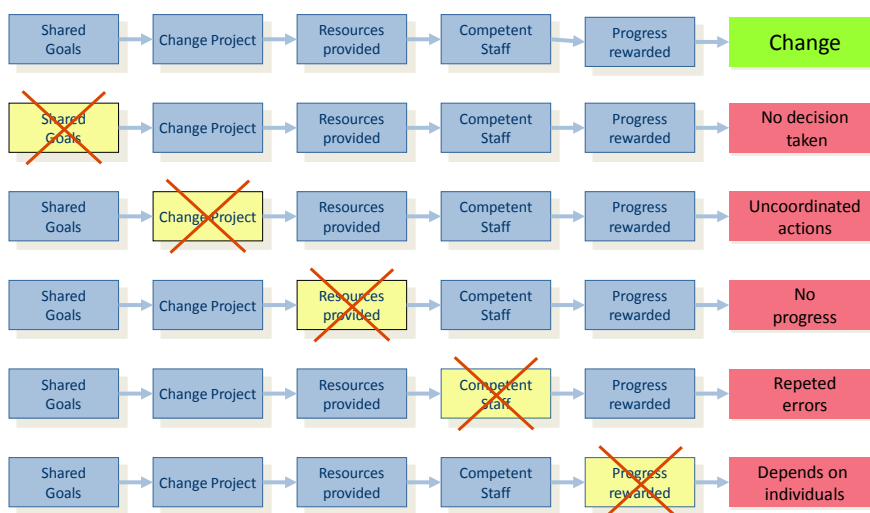
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Deployment tactics

- Sensitization
- Training
- Informal Assessment
- Improvement Plan
- Deploy the planned actions
- Change management
- Official Assessment
- Communication

Otherwise





Feedback

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Average delay to move up

- Level 1 to 2 : 19 months
- Level 2 to 3 : 20 months
- Level 3 to 4 : 25 months
- Level 4 to 5 : 13 months

- Total average delay: 6,5 years



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Return on Investment

- Cost: 3,5 to 7% of the R&D budget has to be allocated to the CMMI project
 - 5% according to the SEI
 - 2,5% according to Thales
- ROI :
 - Alstom 7:1
 - SEI 5:1
 - Thales 6:1
 - Accenture : 5:1 for quality related activities
 - Northrop Grumman 13:1 defect prevention

Examples of Impact

- Quality
 - Reduced software defects per million delivered SLOC by over 50 percent compared to defects prior to CMMI (Lockheed Martin Systems Integration)
- Schedule
 - Decreased avg # of days late from 50 to < 10 (General Motors)
- Productivity
 - Improved software productivity from a 1992 baseline by approximately 80% at SW-CMM ML 5 in 1997 to over 140% at CMMI ML 5 in 2001 (Lockheed Martin Systems Integration)
- Overall
 - Met every milestone (25 in a row) on time, with high quality and customer satisfaction (Northrop Grumman DES)

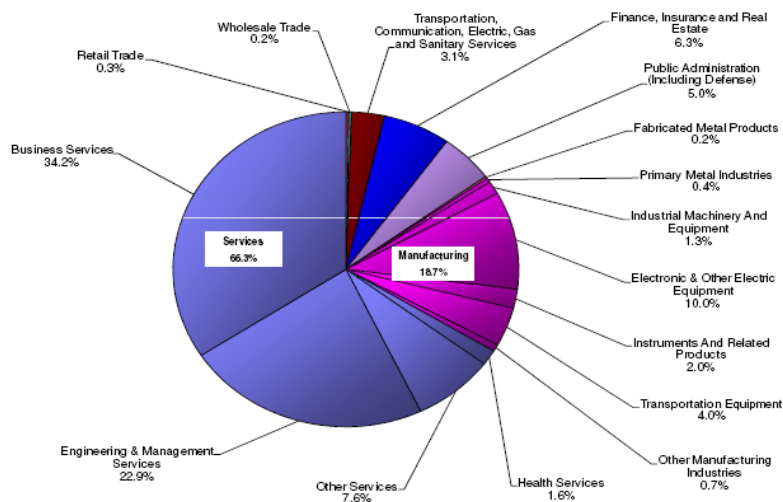
The most « profitable » activities

- Techniques for eliminating defects
- Requirement management
- Reliability of estimates
- Training people

Profits

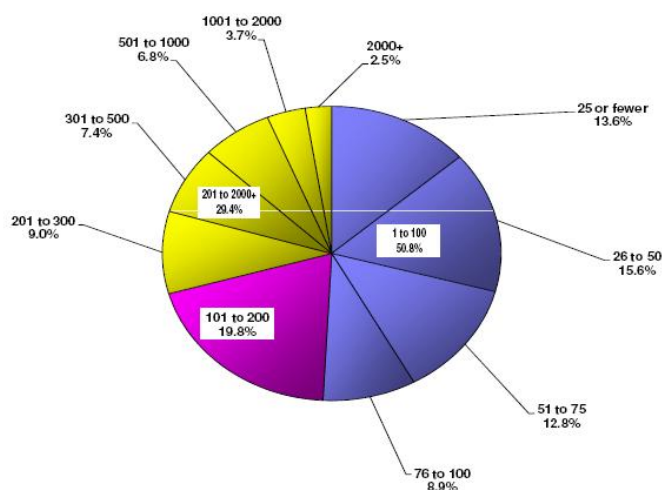
Profit	Lev 1	Lev 2	Lev 3	Lev 4	Lev 5
Rework	40%	20%	10%	6%	3%
Accuracy of Estimates	± 30% à >100%	± 10% à ± 20%	±5%	±3%	±1%
Defects delivered	X	½ X	¼ X	1/10 X	1/100 X
Defect prevention	< 30%	60%	80%	>90%	99%
Reuse of components	Negligible	Negligible	Occasionnal	>30%	>50%
Productivity	X	1.5 X	2 X	3-4 X	>4 X

The types of organizations



The size of the organizations

Based on the total number of employees in the area evaluated





Conclusion

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5 reasons to adopt CMMI



- CMMI helps your organization to ...
 1. Improve delivery of product and service performance, cost, and schedule
 2. Collaborate with external stakeholders and meet their expectations in day-to-day activities
 3. Provide competitive world-class products and services
 4. Implement an integrated enterprise business and engineering perspective
 5. Use common, integrated, and improving processes for systems and software



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CMMI

- This is not an End in itself
- The indiscriminate deployment of CMMI does not guarantee the achievement of "business"
- Avoid excesses of Ayatollah
- A well proportioned deployment, not forgetting the human dimension

Conclusion

- Rewarding for employees
- Reduces stress
- Profitable investment
- Improvement culture

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Optimise testing through capitalization

Optimise testing through capitalization

- Optimize :
 - Test Effort
 - Coverage
 - ...
- What data to collect to optimize the next test campaign ?



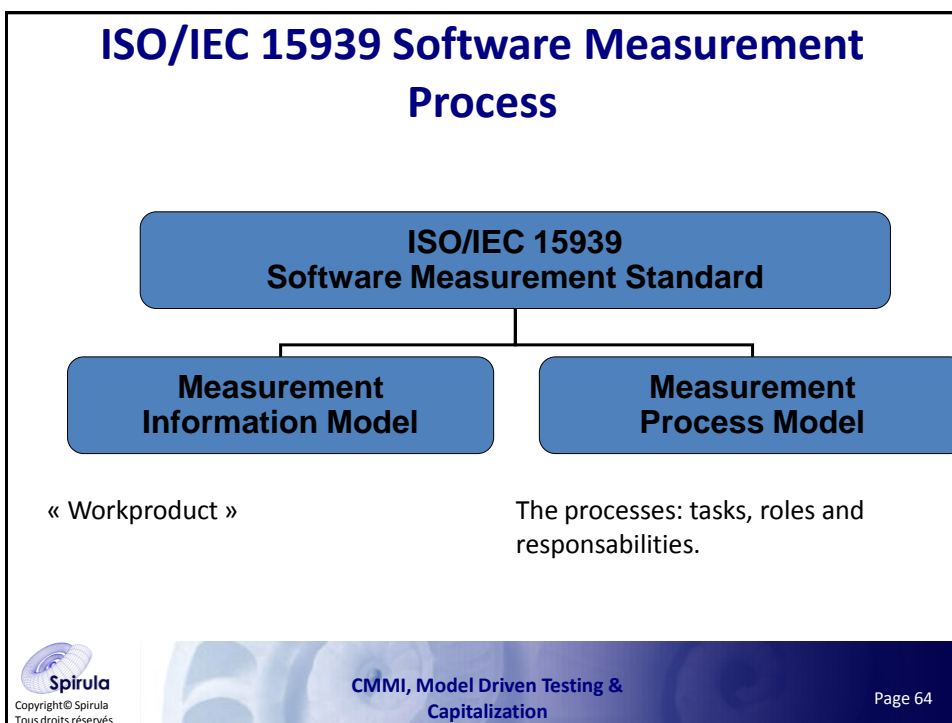
Measurement & Analysis

CMMI – M&A

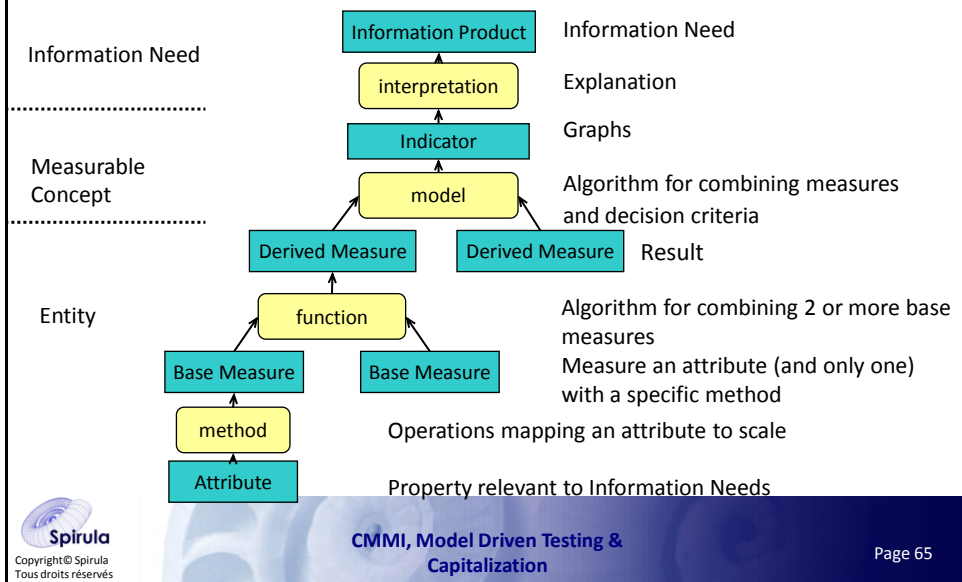


Measurement Processes ISO, PSM, SEI

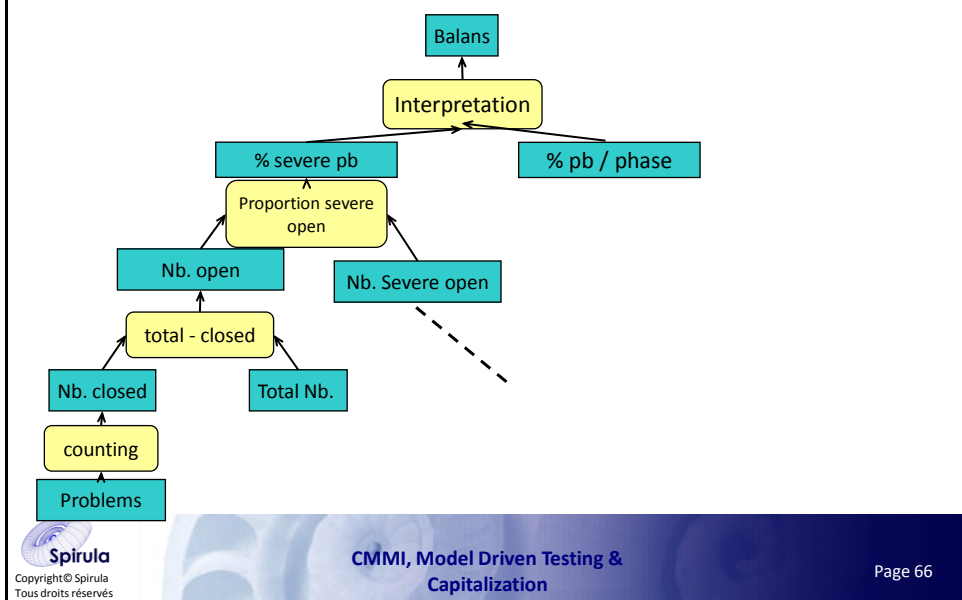
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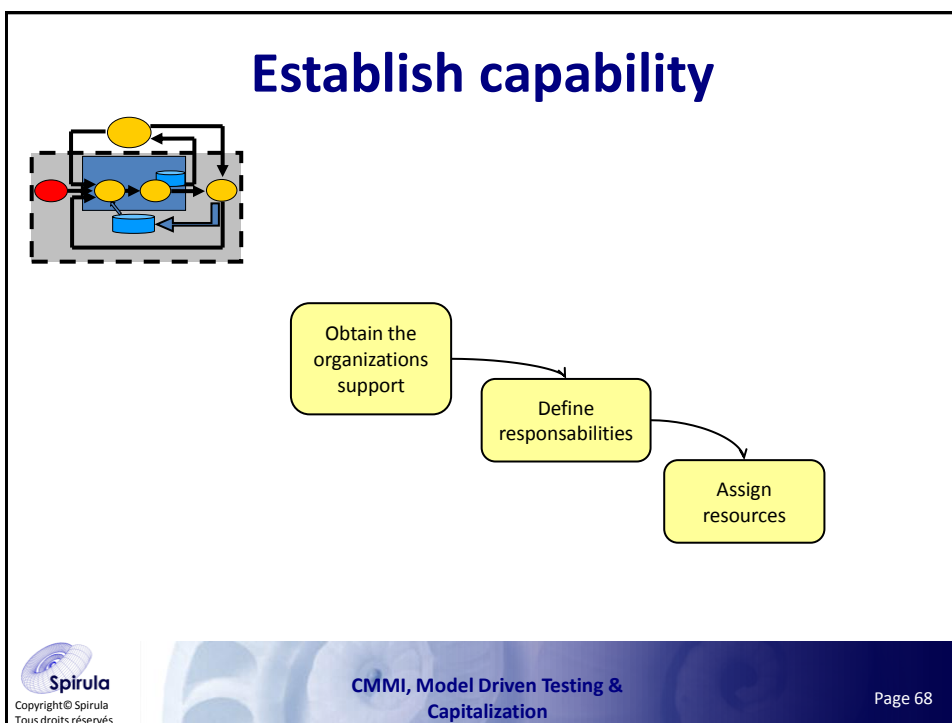
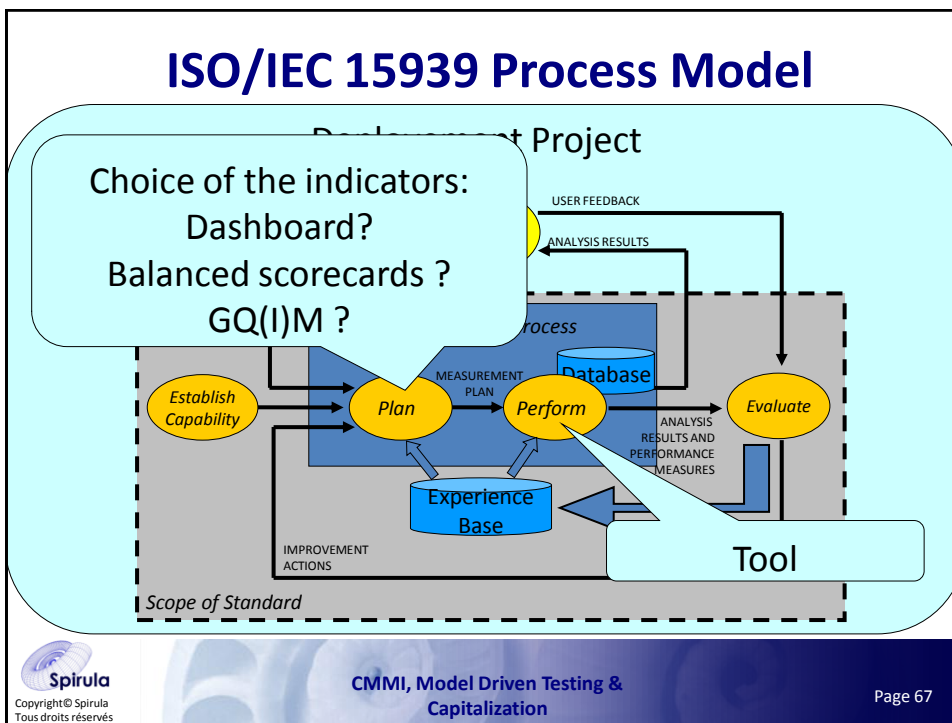


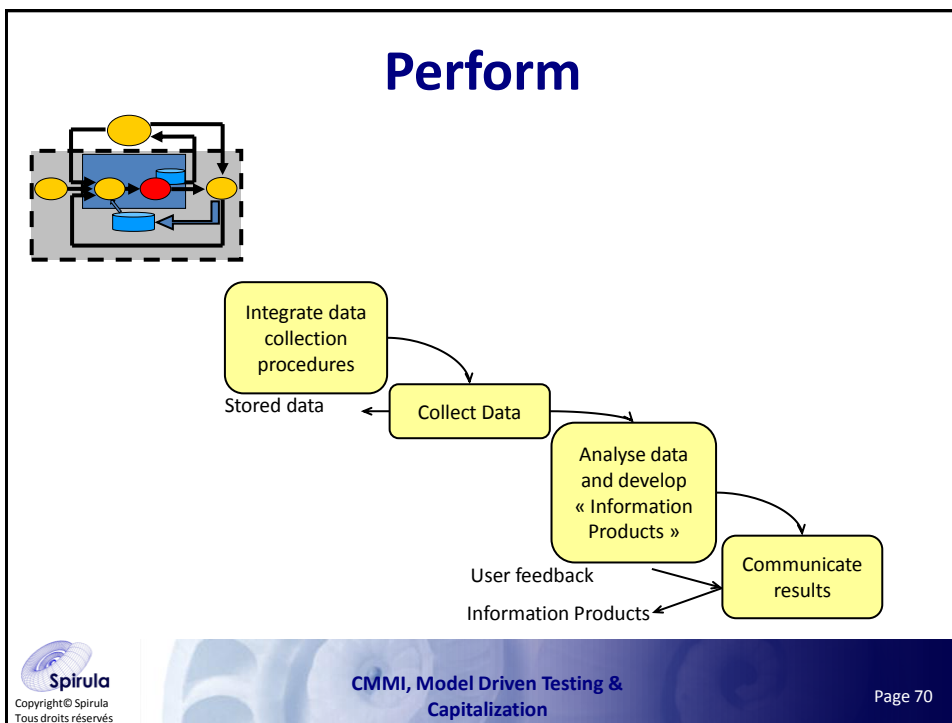
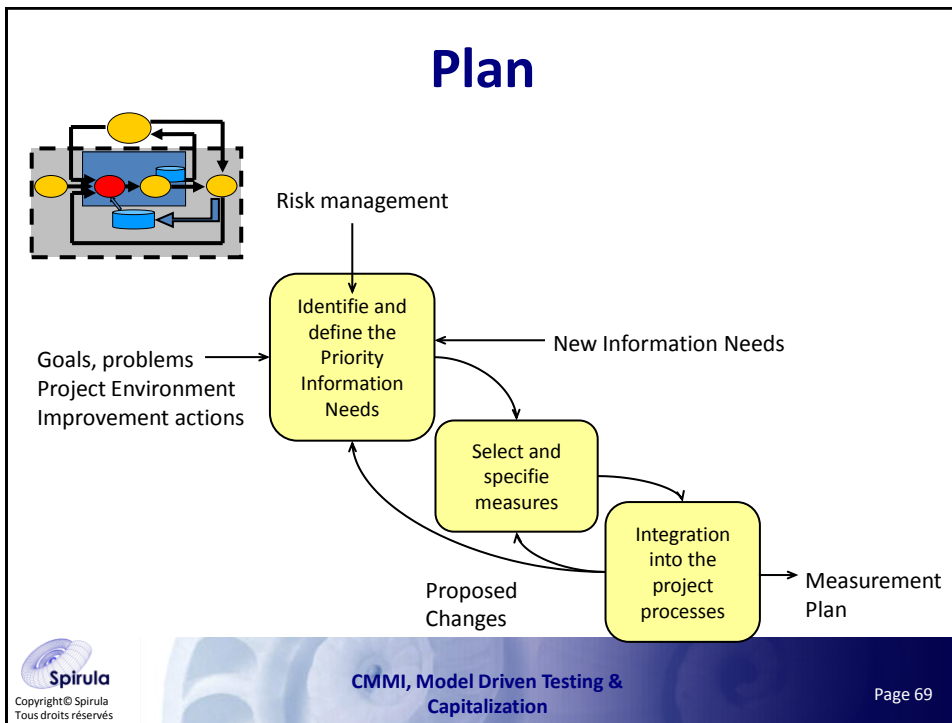
Measurement Information Model

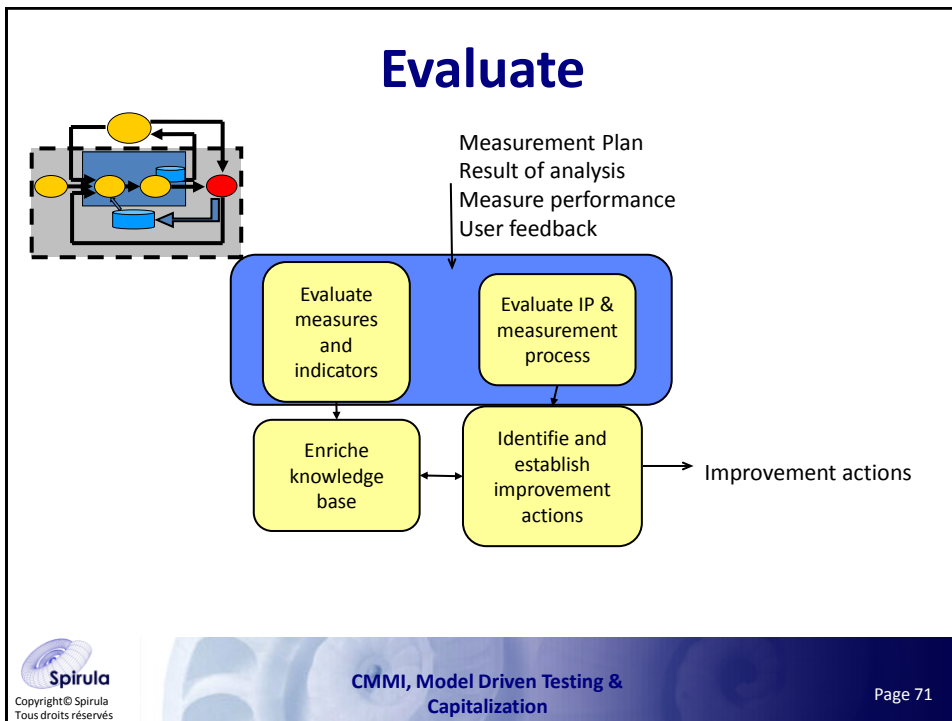


Example











Organization to establish

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Measure: different skills

- Analyze needs
 - Define indicators
 - Design the reporting chain
 - Implement indicators
 - Produce extractors
 - Organize & manage the repository
 - Analyze historical data
- }

DESIGN
- }

IMPLEMENT
MANAGE

Using different techniques for the specification of indicators, design of Balanced Score Cards, Dashboards, GQ (I) M, statistical analysis, ETL,

Tools



Management

Project

Quality & SEPG

Integrator

Reporting

Library of Indicators

Measurement Repository

Extractors

Excel

XML

CSV

Database

Tools



Select Indicators

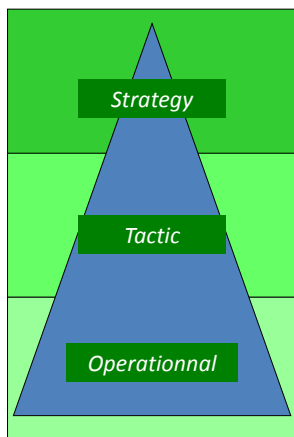
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The right indicator for the right manager

Every management level

Needs different indicators

And an appropriate display



- Business Results
- Strategic Plan
- Conformity

- Performance
- Process and productivity improvement

- Resources & Cost
- Planning & Progression
- Product Quality
- Customer Satisfaction



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Indicators to do what?

- Alarm:
 - Exceeding the boundaries.
- Manage an activity, a project :
 - Budget, real, limits, ...
- Process improvement
 - Analyze historical data and study trends.
 - Capitalize the process knowledge
- Communicate and supervise a strategy
 - One vision, one tool for one group of individuals.
Communication and reporting.

Measures have to be

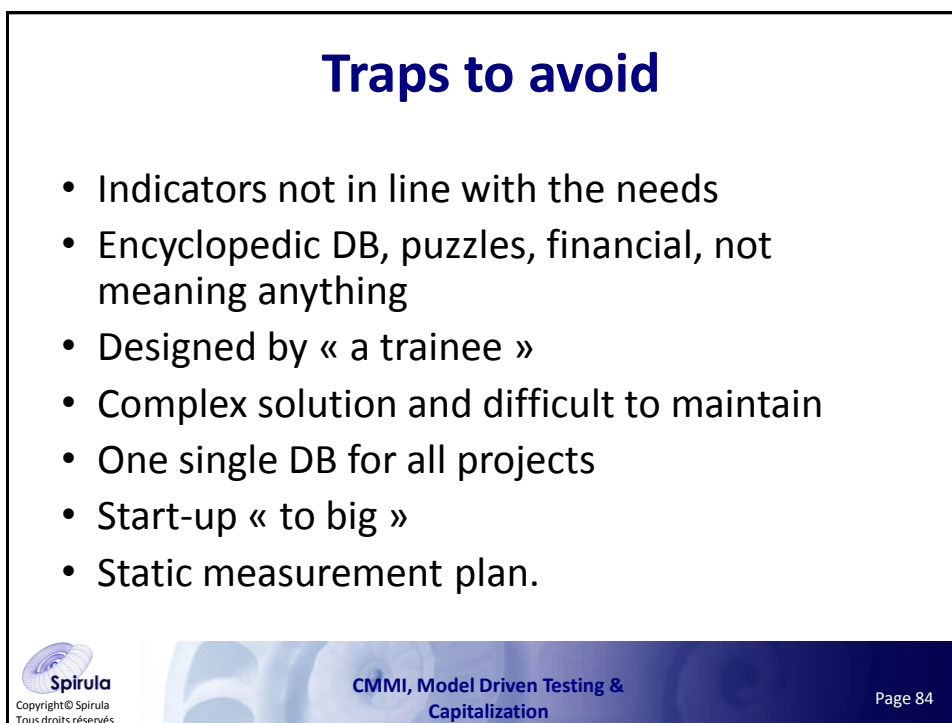
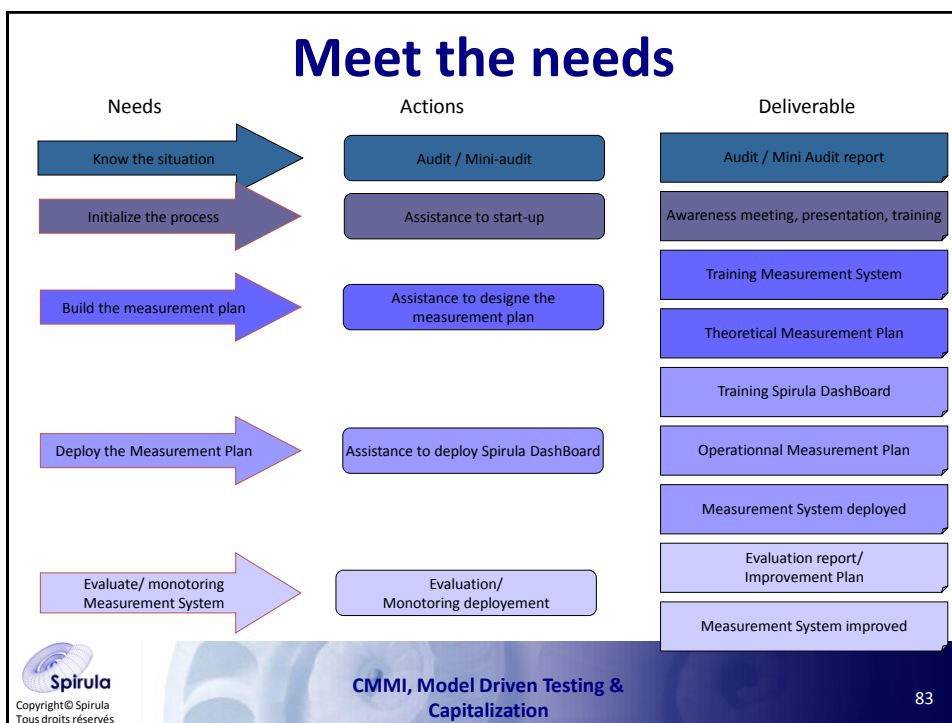
- Selected in order to tell you something important to succeed (ex.: objective, pb, risk, uncertainty)
- Aligned with business objectives in order to create benefits
- Concentrated on the earliest detection for prompt corrective actions
- Used on a regular basis and for decisions
- Well defined in order for everyone to understand and compare them
- Communicated in an unbiased manner

To succeed ...

- Training:
 - Measurement Process
 - GQ(I)M
 - PSM
 - BSC



Deployment

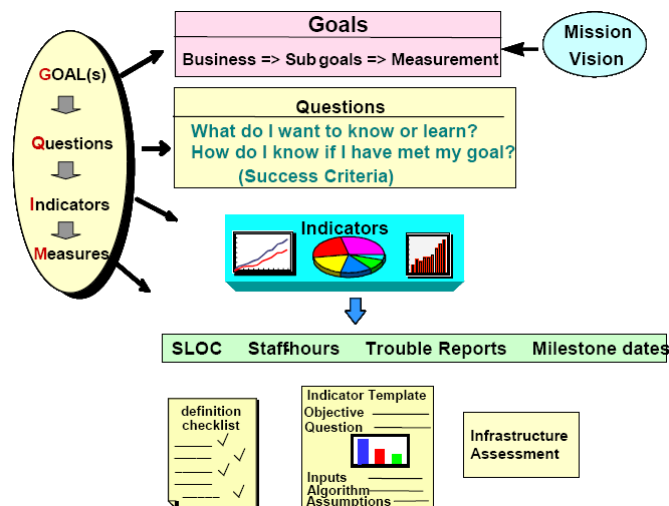




Measuring tests

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GQ(I)M



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Define business objectifs

- Identify the objectives the organization wishes to meet

Example: Maximize software quality

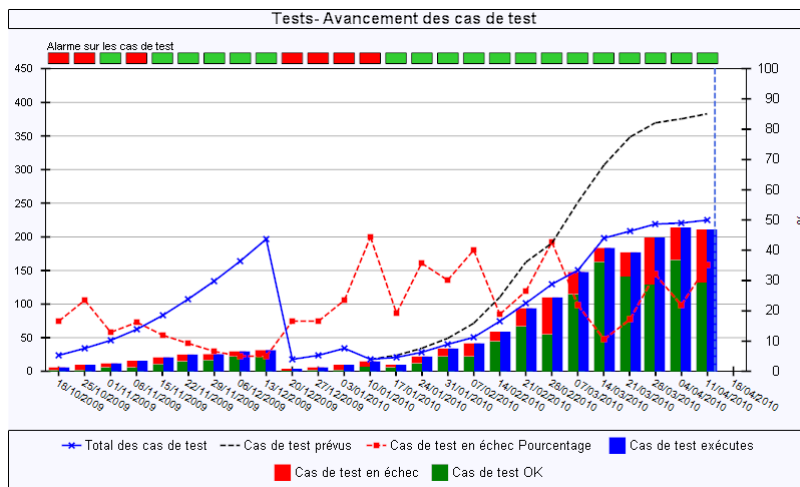
Generate questions

- For each business objective, derive one or several questions on whether the goal is reached.

Example:

- Are there any severe defects and / or means detected in operation?
- What are the phases where these defects were injected?
- What is the test coverage?

Define and develop indicators



To help you...

- <http://demo.datadrill.info/indicatorexpert/Default.aspx>



Playtime!!

What titles would you give to the following pictures?

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17h00

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Measurement & Capitalization

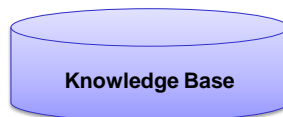
Demo DataDrill Express



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100

Capitalization



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101

Testimony

- Our program managers spend 50% of their time doing "Excel shit"
- The project data are not centralized, easily accessible or usable
- Generate reports and share information metrics takes too long to decision makers
- Re use data from the past projects is impossible
- We spend more time in putting data in Excel than we spend in project management
- ...

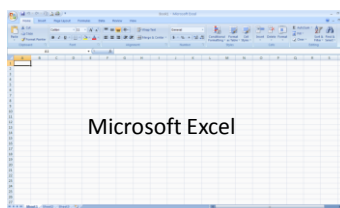
Why Not Excel?

Using Microsoft Excel for performance measurement is tempting to many organizations because it **appears** to be a simple solution the challenges of providing good information to decision-makers.

No learning curve

Available and easy to use

Macros may help



Difficult to access easily

Burdensome data integrations

Hard to support multiple users

Why DataDrill?

Microsoft
Excel

DataDrill
EXPRESS

No learning curve

Available and easy to use

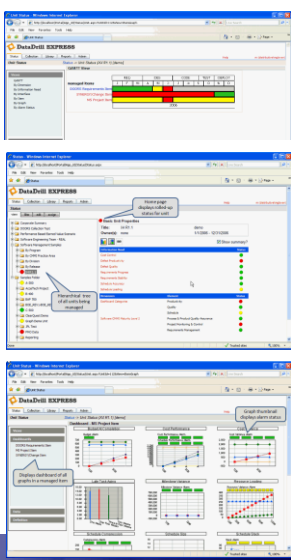
Macros may help


Automated data collection


Library of best practices

Information model based on ISO/CMMI

Efficient deployment

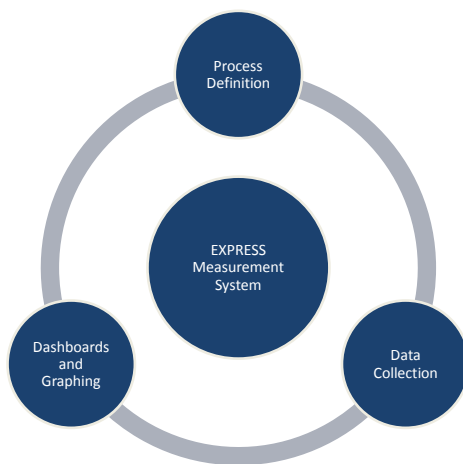







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EXPRESS Automates Your Measurement Plan



- ✓ Launch an Out-of-the-Box Measurement Process
- ✓ Deploy Software Management Best Practices
- ✓ Manage By Exception
- ✓ Demonstrate Compliance with Standards and Models
- ✓ Quickly Initiate New Projects
- ✓ Integrate and Collect Critical Metric Data
- ✓ Integration with SEER-SEM

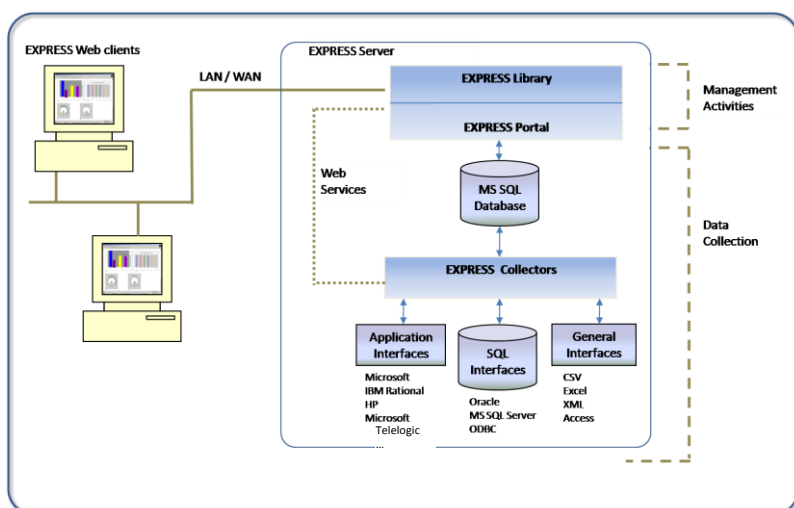


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Demonstration

- Alert mail
- Presentation DDE interface
- Indicators for monitoring tests
- Reuse the past
- Collectors
- Reporting Office

DataDrill Express Components



Prices

Team

- 1 admin
- 5 managers

4 995 €

Program

- 2 admin
- 10 managers

7 995 €

Department

- 2 admin
- 10 managers
- 10 executives

9 995 €

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Graphing - New Graph Factory

DataDrill EXPRESS
Graph Display: Bubble Graph

DataDrill EXPRESS
Graph Display: Manhattan Bar Graph

DataDrill EXPRESS
Graph Display: Funnel Graph

DataDrill EXPRESS
Graph Display: Scatter Graph

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Evaluation 1

- **Proof Of Concept on site**
 - Spirula delegates a consultant on site to work on some specific issues such as integration issues
 - Period : 1 to 4 weeks
 - Charges: 3-5 days consulting
 - The days of consulting are charged (1.300 € / day)
- **Advantages**
 - No installation
 - Feasibility Demonstration with the prospects' data and tools
 - Brief review, immediate results



Evaluation 2

- **Testing Program Size**
 - Spirula proposes a test phase with actual implementation of the tool. This includes skill transfer and support for two people.
 - The work is reusable for future deployment.
 - Period : maximum 3 months
 - The software is paid one month, then leased the following months (1.500 € / month)
 - Training and skills transfer are charged
- **Advantages**
 - In-depth assessment
 - Reuse of the investment



Hardware

Recommended hardware configuration for a system running up to 50 EXPRESS Portal concurrent users:

- Intel Dual Processor or AMD/Intel 64 Bit Processor
- 4 GB of RAM (2 GB minimum for test only – not production)
- 500 MB of free disk space

After the initial 50 users, add 1 GB of RAM for each additional 25 users that are expected to be online concurrently. For example, 100 concurrent users, require 6GB of RAM.

Supported Windows Operating Systems:

- Windows Server 2003 (production)
- Windows XP Professional (test and demonstration only – not production)
- Windows Vista (test and demonstration only – not production)

Required System Components (must be installed prior to installing DataDrill EXPRESS):

- Internet Information Server version 5, 6, or 7
- .NET Framework 2.0
- Microsoft SQL Server (2005 or 2008)
 - Microsoft SQL Server Express can be used for test or demonstration purposes
 - Microsoft SQL Server Management Studio must be installed on the machine where the DataDrill EXPRESS installation is being run.
 - Microsoft SQL Server Client tools must be installed on the DataDrill server if the SQL server engine is on a different server

Windows account with permissions to create users and databases in SQL Server - In order to run the configuration utility, which creates and configures the database, the Windows account used to run the install must be able to create users and databases in SQL Server.



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Vielen Dank für Ihre Aufmerksamkeit

Fragen ?

