

[13° Automotive SPIN Italy Workshop](#)

Milan (Italy), November 12 2015

Play LEGO and Improve!



A 'magic' combination for
improvement

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- ✓ **G1.** Introduce **AutomotiveSPICE v3.0**
- ✓ **G2.** Present the **LEGO** technique and how to use it taking advantage from multiple models and framework
- ✓ **G3.** Show possible advantages adopting LEGO for improvement projects in the Automotive sector → an example will be presented for MAN.5 (Risk Management)



GROUP

The first Italian IT reality in the creation and management of systems, services and processes, for meeting the innovation needs of citizens and those of change management of public and private organisations.

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business solutions,
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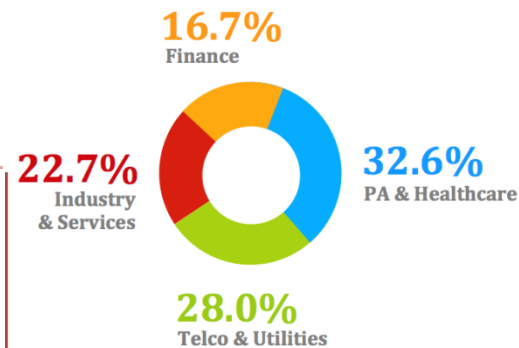
43 branches in Italy and abroad, a strategic, consolidated and growing international presence.



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8% market share in Italy
7,400 professionals
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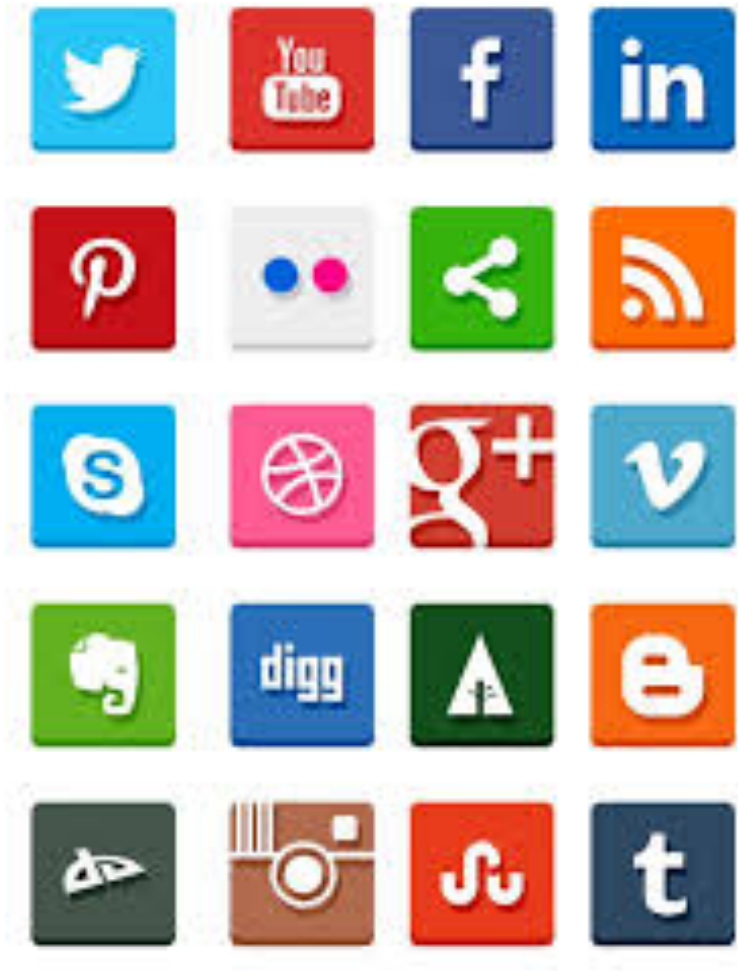


TOTAL REVENUES
853
Mn€

EBITDA
109.9
Mn€

NET PROFIT
42.7
Mn€





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- ✓ #Automotive
- ✓ #LEGO
- ✓ #MCM
- ✓ ...



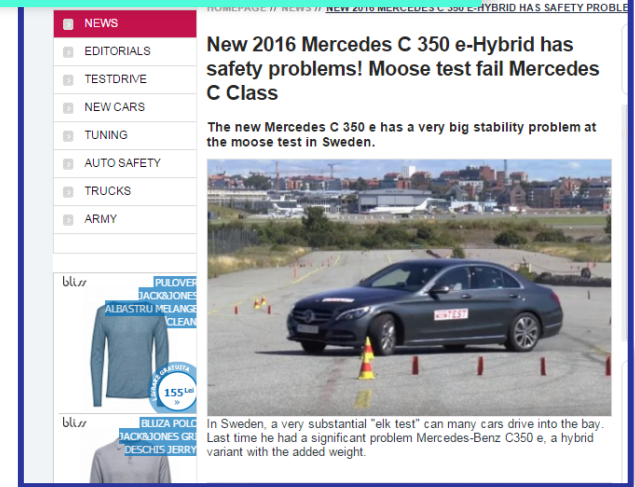
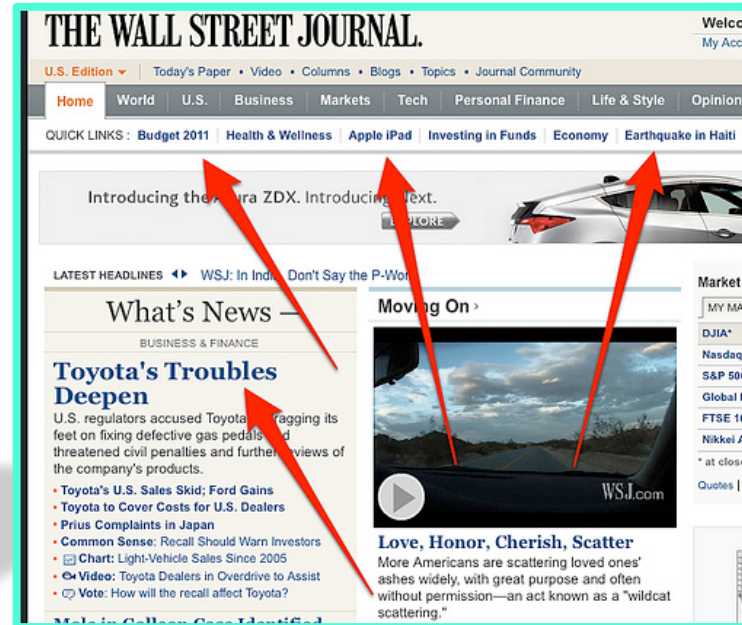
- **Introduction**
 - Some recent issues...
 - Some (important) questions...
- **MCMs (Maturity & Capability Models) – Representations & Dimensions**
 - Why do we need choosing a MCM?
 - Coverage and classification of MCMs
 - Why Risk could be valuable when dealt using more models?
- **MCMs & Risk Management in Horizontal MCMs (H-MCMs)**
 - CMMI-DEV/SVC and ISO/IEC 15504-2 (-> 330xx series)
 - Automotive SPICE v3.0 and the others
- **A 'Magic' moment...**
- **LEGO and Risk**
 - The LEGO approach
 - Applying LEGO to Risk "Elements of Interest" (EoI)
 - Suggested Improvements
- **Conclusions & Prospects**
- **Q & A**





Introduction

Some recent issues...



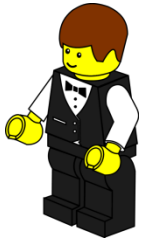


Do we properly manage risks and safety in our projects?



ISO 26262 family is the solely/main source considered for improving our processes?

Can **A-SPICE**, **CMMI** and/or other MCMs be used too?



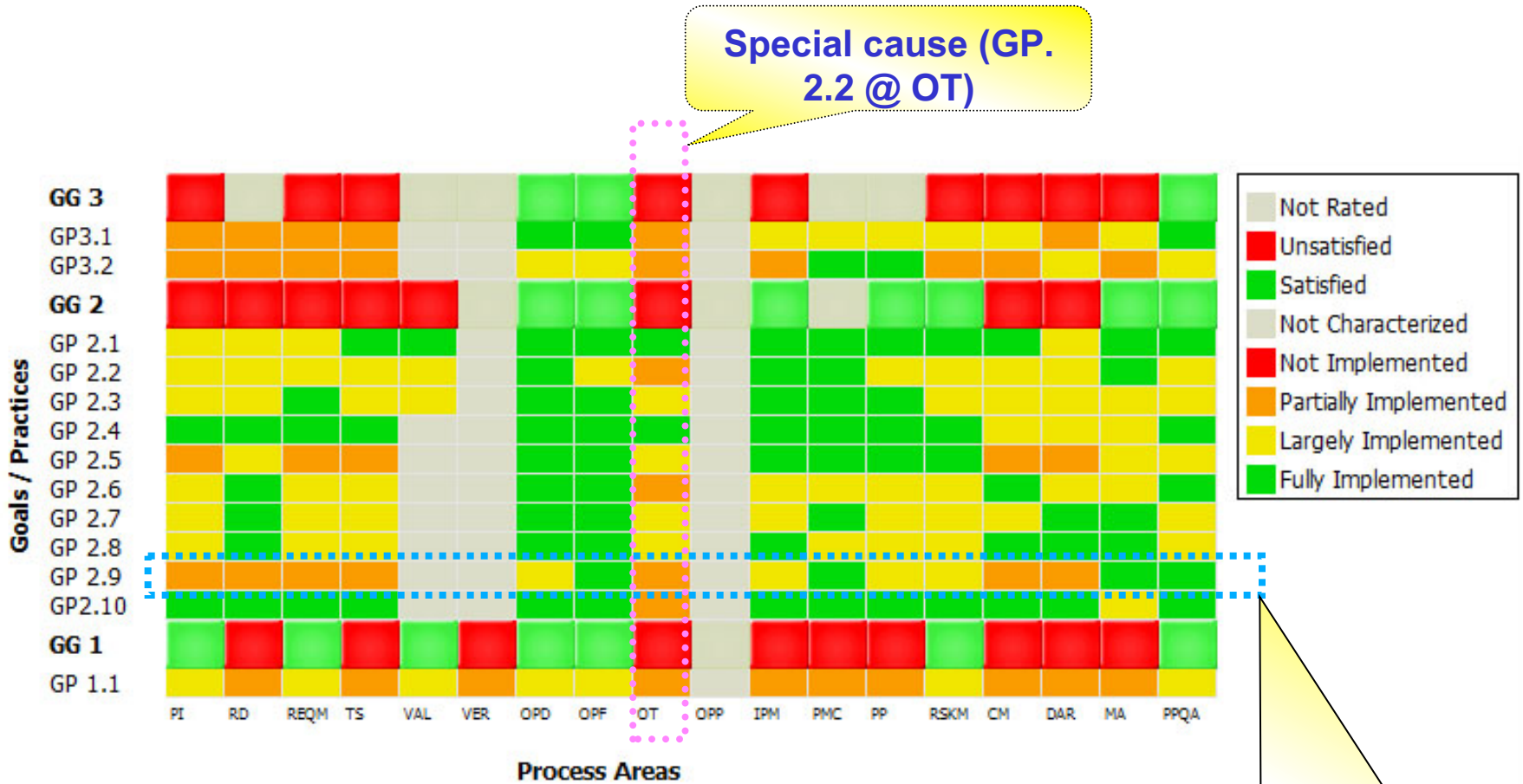
How much **value** are we creating for our projects?



Maturity & Capability Models (MCMs)

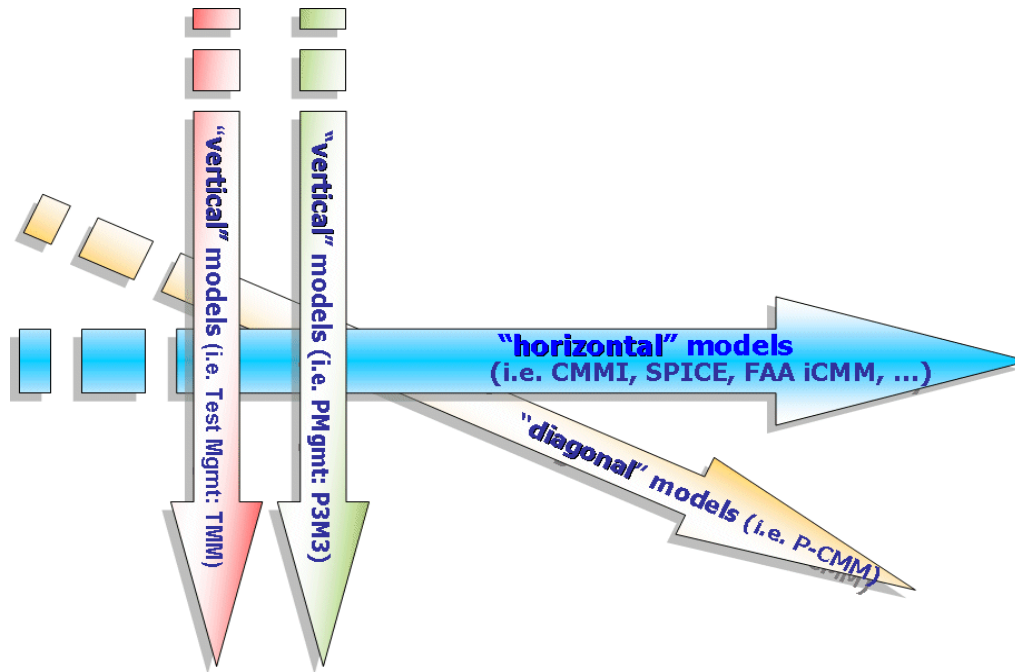


The screenshot shows a Google search interface. At the top, there is a navigation bar with links for '+Luigi', 'Ricerca', 'Immagini', 'Maps', 'Play', 'YouTube', 'News', 'Gmail', 'Drive', 'Calendar', and 'Altro'. Below this is the Google logo and a search bar containing the text '"maturity model"'. To the right of the search bar is a blue search button with a magnifying glass icon. Below the search bar, there are tabs for 'Web', 'Immagini', 'Maps', 'Shopping', 'Più contenuti', and 'Strumenti di ricerca'. The 'Web' tab is selected and highlighted with a red dashed circle. Below the tabs, the search results are displayed. The first result is 'Circa 1.450.000 risultati (0,22 secondi)'. Below this, there is a suggestion: 'Suggerimento: [Cerca risultati solo in italiano](#). Puoi specificare la lingua di ricerca in [Preferenze](#).' The first search result is 'Maturity model - Wikipedia, the free encyclopedia' with the URL 'en.wikipedia.org/wiki/Maturity_model' and a 'Traduci questa pagina' link. Below this is a snippet: 'Maturity model. From Wikipedia, the free encyclopedia. Jump to: navigation, search. Maturity Model may refer to: Capability Maturity Model (CMM); Capability ...'. The second search result is 'Capability Maturity Model - Wikipedia' with the URL 'it.wikipedia.org/wiki/Capability_Maturity_Model' and a 'Traduci questa pagina' link. Below this is a snippet: 'Capability Maturity Model Integration (CMMI) è un approccio al miglioramento dei processi il cui obiettivo è di aiutare un'organizzazione a migliorare le sue ...'. Below the snippet are links: 'Valutazioni del modello - Le Process Area - Note - Altri progetti'. The third search result is 'Capability Maturity Model - Wikipedia' with the URL 'en.wikipedia.org/wiki/Capability_Maturity_Model'.



• Source: <http://goo.gl/i6IvI>

Common cause (GP.2.9 @ +PA)



- **Horizontal:** MMs going through the whole supply chain
 - ✓ **SwEng:** ISO 15504, CMMI, FAA i-CMM, ...
- **Vertical:** MMs focusing on a single perspective/group of processes
 - ✓ **Test Mgmt:** TMM, TPI, ...
 - ✓ **Project Mgmt:** PM-MM, OPM3, ...
 - ✓ **Risk Mgmt:**
- **Diagonal:** MMs focused on Organizational/Support processes
 - ✓ People CMM, TSP, PSP, ...

Source: Buglione L., An Ecological View on Process Improvement: Some Thoughts for Improving Process Appraisals, **AWGSD**, 4th World Congress on Software Quality, Washington D.C. (USA), 15-18 September 2008

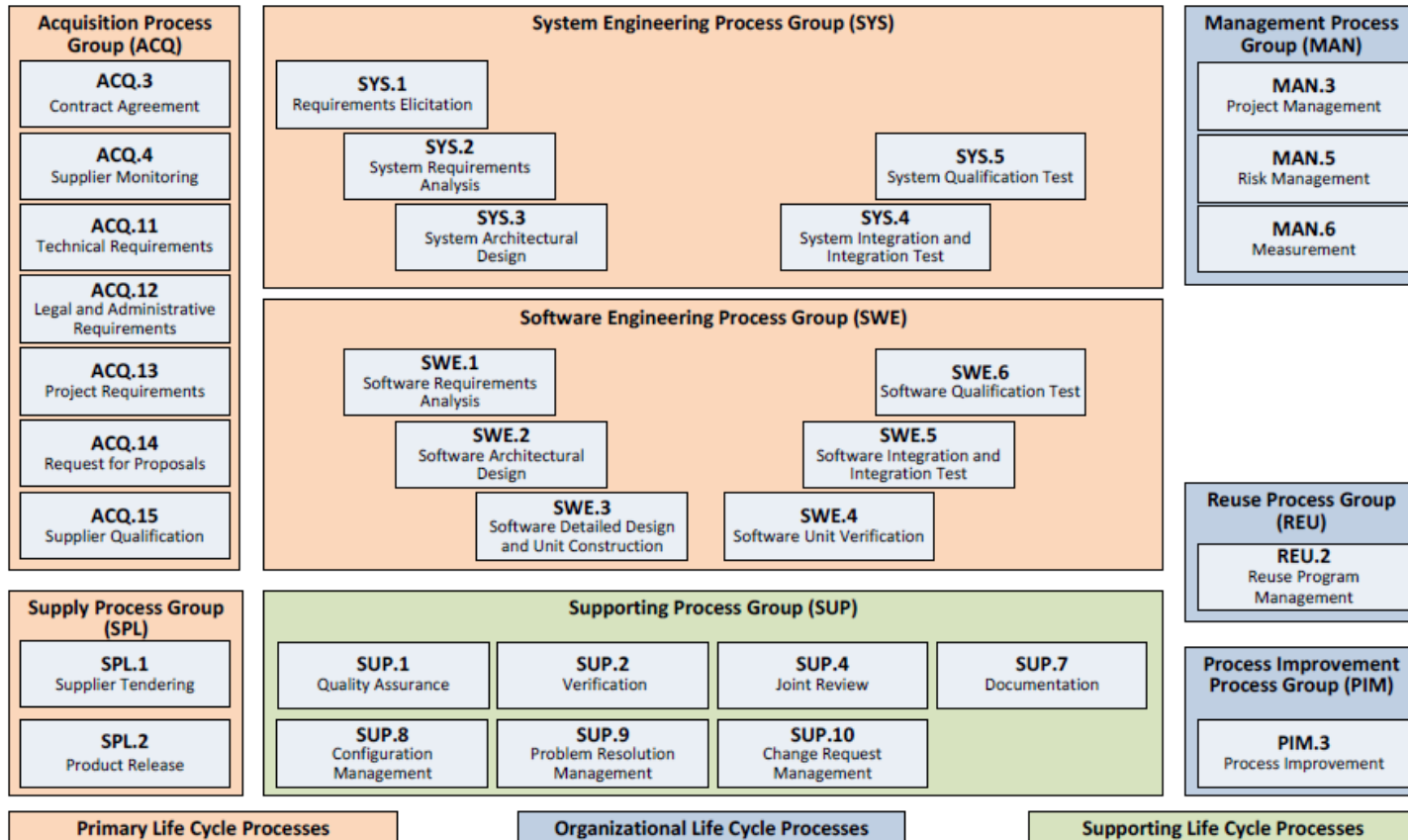


- A-SPICE considers a subset of ISO/IEC 15504-2 PRM
- Released in July 2015 v3.0
- Split of ENG.x processes into SYS and SWE groups
- Here the main changes:

Release Notes

Version 3.0 of the process assessment model incorporates the following major changes:

Chapter 1	Editorial adaption to ISO/IEC 330xx series, Notes regarding combined PRM/PAM in this document
Chapter 2	Adaption to ISO/IEC 330xx series
Chapter 3	Text optimized for better understanding and adapted to ISO/IEC 330xx series.
Chapter 4	Renaming ENG to SYS/SWE, Structure of old ENG Processes changed, Rework of AS 4.5 process reference model and AS 2.5 process performance indicators focusing on a set of highly significant processes assessed within the automotive industry (HIS Scope).
Chapter 5	Adaption based on AS 2.5 to the measurement framework of ISO/IEC 33020
Annex A	Conformity statement adapted to ISO/IEC 33004
Annex B	Modifications on work product characteristics according to the changes in chapter 4.
Annex C	Update to recent standards. Introduction of specific terms used in AS 3.0
Annex D	Added the major concepts used for AS 3.0, incorporated Annex E of AS 2.5
Annex E	Updated references to other standards



- A-SPICE considers a subset of ISO/IEC 15504-2 PRM
- ...but where are specific risk-related processes? Here the references:
 - ✓ Processes: **MAN.5** + ACQ.3, ACQ.4, ACQ.13, ACQ.15, SYS.1, SWE.1, SWE.3, SUP.10, MAN.3
 - ✓ WPs: 07-07; 08-19; 08-20; 13-20; 15-08; 15-09
 - ✓ PAs: 4.1 (GRs); 5.1 (GP5.1.1); 5.2 (GP5.2.2)
- ...but could we consider also 'external' sources/extensions in a A-SPICE assessment?

RISK

MCMs & Risks



Model	CMMI-DEV	Automotive SPICE v3.0
Domain	Sw-SE	SYS-SWE
PRM (source)	CMMI-DEV v1.3	ISO 12207-15504
PRM (# Processes)	22	32
Process Categories	RSKM (Risk Management) – ML3 (Staged representation)	MAN (Mgmt process group)
Safety-related process(es)	1 RSKM (Risk Management)	1 (MAN.5 – Risk Management)
PAM ext. Appraisals	SCAMPI v1.3	ISO 15504-2/5 (new 33000 series)
PAM safety-related issues	PP-SP-2.2 (Identify Project Risks) PMC-SP-1.3 (Monitor Project Risks)	ACQ.3, ACQ.4, ACQ.13, ACQ.15, SYS.1, SWE.1, SWE.3, SUP.10, MAN.3





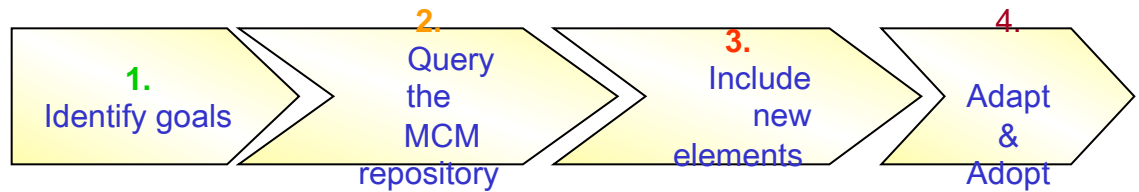
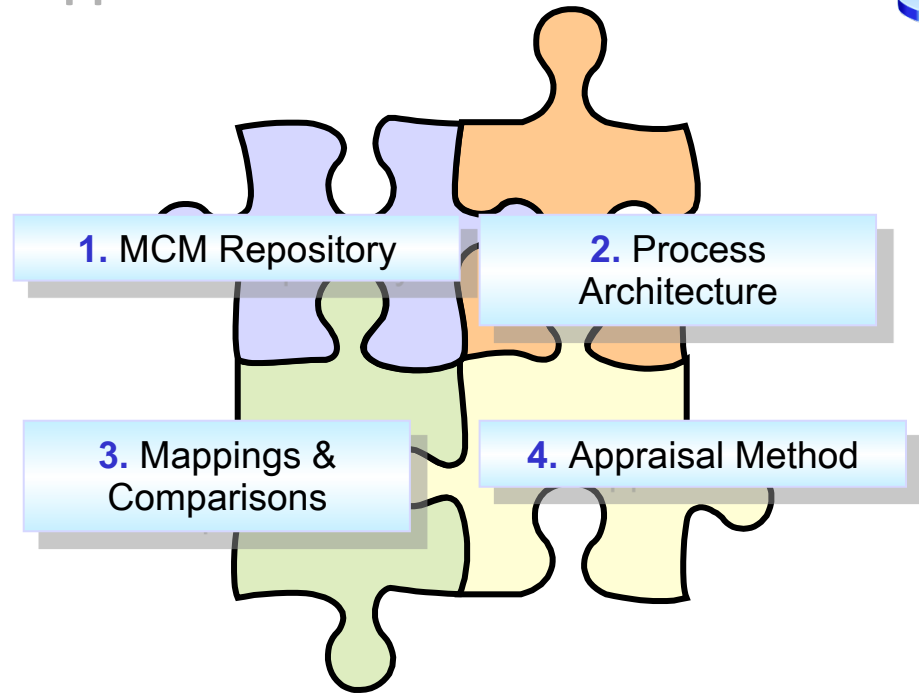
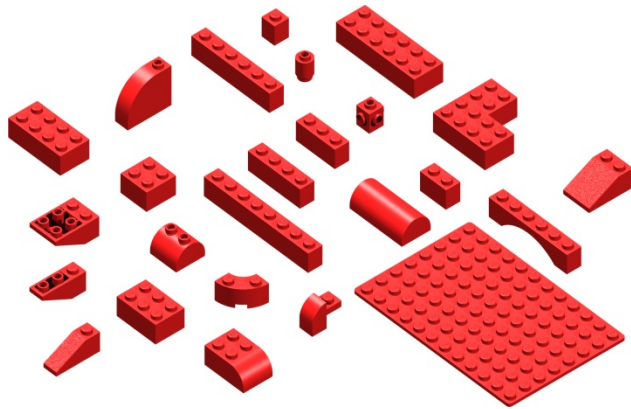
Model/ Framework	Repr. Type	ML (#)	Architect-Type	Comments/Notes
Project Risk Maturity Model (PRMM)	Staged	4 [1-4]	Level-based	• 6 perspectives
IACCM CMM	Staged	5 [1-5]	Level-based	• 9 dimensions (#7: Risk Management)
MMGRseg	Continuous	5 [1-5]	Level-based	• Aligned with ISO/IEC 27005 [32]; 43 Control Objectives into 6 groups; Final Risk Scorecard
MPS RMMM	Staged	6 [1-6]	Matrix-based	• 6 drivers for assessing on an ordinal scale business risk
RIMS RMM for Enterprise Risk Management (ERM)	Staged	6 [0-5]	Matrix-based	• 7 process attributes; for each one, a series of Key Drivers defined
IS RMM	Staged	5 [1-5]	Level-based	• 9 control elements, each one with a variable number of components
INCOSE RMM	Staged	4 [1-4]	Matrix-based	• 5 Drivers
Risk Analysis (WBS) + RBS	---	---	WBS -based	• Creation of a Risk Breakdown Structure according to the project WBS and quantification of risks by each WBS task (calculation)
...				



LEGO & Risk

LEGO and Risk Mgmt

The LEGO Approach



Source: Buglione L., Gresse von Wangenheim C., Hauck J.C.R., Mc Caffery F., *The LEGO Maturity & Capability Model Approach*, Proceedings of 5WCSQ, 5th World Congress on Software Quality, Shanghai (China), Oct 31- Nov 4 2011





The LEGO steps & related activities & outcomes:

1. Identify Goals

- ✓ Improve the **Risk Management** capability in order to generate more value to our organization along time
- ✓ Assumed the target BPM (Business Process Model) to improve is the **MAN.5 Risk Management** process

2. Query the MCM repository

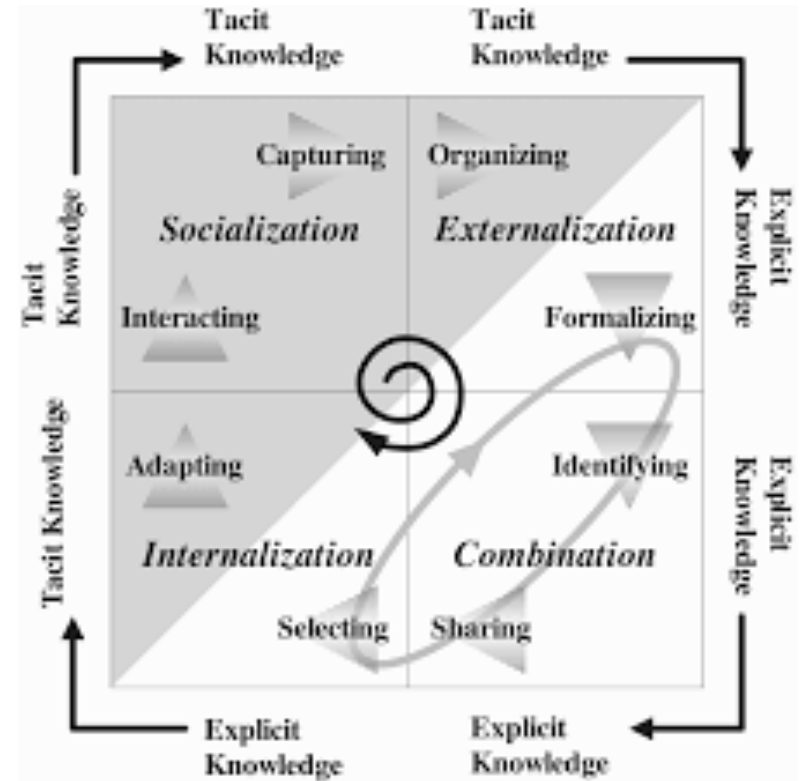
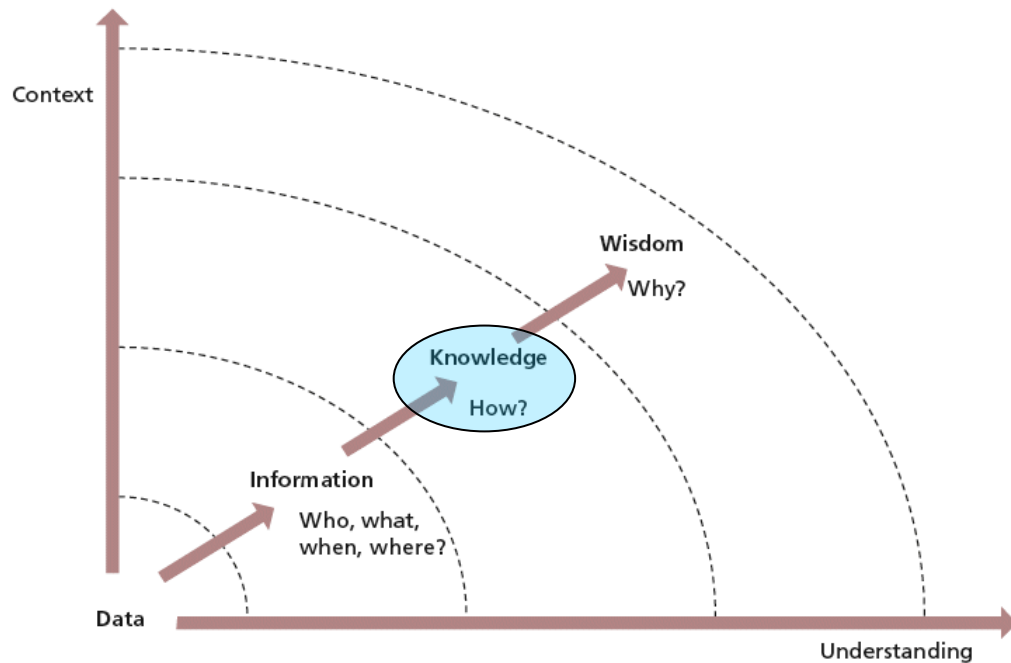
- ✓ Filter the list of available Safety-based MCMs from the MCM repository
- ✓ Next table (**EoI** – Element of Interest) is a filter of the elements by each of the KM MCMs considered

3. Include new elements into the target BPM

- ✓ Next table (Suggested Improvements) lists the possible EoI matched with the requested MCMs (both SPs and GPs)

4. Adapt & Adopt

- ✓ Map each practice of the improved process to the related internal QMS process(es)
- ✓ Validate the mapping results before using it in the daily activities



- **ITIL v3 DIKW**
- **Data/Information/Knowledge/Wisdom**
 - ✓ Four KM waves
 - ✓ **Verifying (DIKW):** Data → Information → Knowledge → Wisdom
 - ✓ **Building (WKID):** Wisdom → Knowledge → Information → Data
 - ✓ **'5W's+H' rule** (who, what, when, where, how, why)
 - ✓ Two dimensions: **Context; Understanding**

- **SECI Model – (Nonaka / Tagueuchi, 1995)**
 - ✓ Socialization, Externalization, Combination, Internalization
 - ✓ **From Tacit to Explicit Knowledge**



Model/ Framework	Elements of Interest (EoI)
<p>Project Risk Maturity Model (PRMM)</p>	<ul style="list-style-type: none"> • Six (6) <i>perspectives</i> (Stakeholders; Risk Identification; Risk Analysis; Risk Responses; Project Management; Culture) • Paid attention to: <ul style="list-style-type: none"> ○ The 'Culture' perspective is interesting because it deals with people attitude towards risk ○ The 'Stakeholders' analysis also can allow to catch all possible threats and vulnerabilities in terms of missing items to be discussed and analyzed for possible contingencies to the project plan. The PRMM process considers their engagement for initiating the risk management process ○ 'Risk Response' is what in other models/frameworks could be the list of 'countermeasures' in a 'Risk Catalogue'
<p>IACCM CMM</p>	<ul style="list-style-type: none"> • Quantitative approach (from SixSigma practices) with nine (9) dimensions (1.leadership; 2. customer/supplier experience; 3. execution and delivery; 4. solution requirements management; 5. financial; 6.information systems/knowledge management; 7. risk management; 8. strategy; 9. people development) • Interesting the eventual inclusion of <ul style="list-style-type: none"> ○ 'Solution Requirements management' ○ 'IS/Knowledge Management', ○ 'People development', as in the SEI's People-CMM
<p>MMGRseg</p>	<ul style="list-style-type: none"> • Alignment with security issues (ISO/IEC 27005 [32]) • Refinement of the maturity levels into three stages (immaturity, maturity, excellence) • 6 Control Objectives (CO) – processes - each one with a series of practices <ul style="list-style-type: none"> ○ CD1 Context Definition; AA1 Risk Analysis/Assessment; RT1 Risk Treatment; RA1 Risk Acceptance; RC1 Risk Communication; MA1 Monitoring & Critical Analysis • Paid attention to: <ul style="list-style-type: none"> ○ CD1.9 (Collect and Store information); AA1.7 (Avoid Rework); AA1.8 (Revise the process of risk estimation); RT1.4 (Define how to measure the effectiveness of controls); RT1.5 (Calculate Residual Risks); RC1.x (all practices); MA1.3 (Standardize the Monitoring and Critical Analysis activity) • Assessment representation with Kiviat graphs, possible to use also a questionnaire (as in the old Sw-CMM) or also a NPLF ordinal scale using the typical MCM appraisal approach



Model/ Framework	Elements of Interest (EoI)
MPS RMMM	<ul style="list-style-type: none"> • ML grow with a larger environment to control (the larger the environment, the higher the ML) • This MCM is about Police Security and cross a series of organizational structures that should be in place, according to their org model • Two dimensions in the matrix-grid: Maturity Level by Maturity Elements • Ordinal scale (No, Minimal, Partial, Yes, Significant; Substantial, Full) for rating each crossed cell in the matrix
RIMS RMM	<ul style="list-style-type: none"> • Seven (7) process attributes (Adoption of ERM-based discipline; ERM process management; Risk appetite management; Root-cause discipline; Uncovering risk; Performance Management; Business Resiliency and Sustainability), for each one, a series of Key Drivers defined • In each process attribute, there is a definition for matching a certain level (from Non-Existent till Level 5) • Particular attention could be devoted to those aspects: <ul style="list-style-type: none"> ○ PA#4 (Root-Cause Discipline) → historicize data, classify risk, understanding the why's ○ PA#5 (Uncovering Risks) → formalizing risk indicators/measures; transforming risks into opportunities (CSF's) ○ PA#7 (Business Resiliency and Sustainability) → understanding of consequences of action or inaction
IS RMM	<ul style="list-style-type: none"> • Nine (9) control elements (Participants; Technologies; Information; Work Practices; Products & Services; Customers ; Infrastructure; Environment ; Strategies) • Based on ISO 31000 Risk Management Process [31], refining the process activities into 'Control Objectives': EC (Establishment of the Context); AP (Risk Assessment); TR (Risk Treatment); CR (Communication); SR (Monitoring & Review) • To pay attention eventually to: <ul style="list-style-type: none"> ○ EC.3 (Define a normalized method for the definition of the context) ○ EC.4 (Define a method of appreciation of the risks) ○ EC.7 (Define a plan of communication) ○ EC.9 (Define the level of tolerance or acceptance of the risks) ○ AP.6 + TR.6 + CR.3 + SR.4 (Collect and Store information about...) ○ SR.1 (Monitor Risk Management Indicators)



Model/ Framework	Elements of Interest (EoI)
INCOSE RMM	<ul style="list-style-type: none"> • Five (5) Drivers (Definition; Culture; Process; Experience; Application) • Checklist (matrix-based) crossing Levels from 1 (Ad-hoc) to 4 (Managed) with the drivers, asin Crosby's Quality Management Maturity Grid (QMMG) [2] • To pay attention eventually to: <ul style="list-style-type: none"> ○ Definition → towards a proactive use of risk management ○ Culture + Experience → learn from experiences, knowledge management for risk management ○ Application → use of quali-quantitative tools helping to deal with risks as an opportunity when planning and estimate a new activity/project





MAN.5 Risk Mgmt process	Suggested Improvements
<p>BP01 - Establish RM scope</p>	<ul style="list-style-type: none"> • Add practices/notes for collecting information about the Context for the project to be analyzed (scope management) • Fundamental a proper definition of events and related risks in a Risk Catalogue • <u>Source(s):</u> <ul style="list-style-type: none"> ○ MMGRseg – CD1.9 ○ IS RMM – EC.3 ○ INCOSE RMM – Definition drivers • Add practices about the need to consider the right stakeholders for eliciting requirements and consequently potential risks form multiple viewpoints. It can help to better define the scope for the project and its related risks • <u>Source(s):</u> <ul style="list-style-type: none"> ○ Project Risk Maturity Model – PRMM - Stakeholders ○ IACCM CMM -- 'Solution Requirements Management'
<p>BP02 - Define RM strategy</p>	<ul style="list-style-type: none"> • Add practices/notes about the strategic need to be <i>resilient</i> as a way to 'genetically' manage risks in a proactive way. Define a method for evaluating risks for a proper (proactive) management. • Communication needs to be part of a risk strategy: people not aware about what is a risk couldn't work for excellence neither for obtain good results (wouldn't be a <i>lean</i> organization, at least!) • Culture and Experience from teams is fundamental to avoid and learn by experience, sharing information by a 'Risk Catalogue' (as well as in IT Service Management models, ITSM personnel use a 'Service Catalogue') • <u>Source(s):</u> <ul style="list-style-type: none"> ○ Project Risk Maturity Model – PRMM – Culture ○ IACCM CMM – IS/Knowledge Management + People ○ RIMS RMM – PA#7 ○ IS RMM – EC.3, EC.5 ○ INCOSE RMM – Culture + Experience drivers



MAN.5 Risk Mgmt process	Suggested Improvements
BP03 - Identify risks	<ul style="list-style-type: none"> • Add practices/notes about the need for a 'risk catalogue', querying it for any risk analysis in order to find yet classified/managed risks, with possible countermeasures. • Any uncovered risk should be recorded as a new item into the risk catalogue, updating the organization risk history as a basis for any further improvement • <u>Source(s):</u> <ul style="list-style-type: none"> ○ IACCM CMM – IS/Knowledge Management ○ MMGRseg – AA1.8 ○ RIMS RMM – PA#7 ○ IS RMM - AP.6 + TR.6 + CR.3 + SR.4
BP04 - Analyze risks	<ul style="list-style-type: none"> • Add practices/notes about the opportunity to have a yet-ready list of possible countermeasures from a Risk Catalogue, properly updated over time from the whole organization's teams • <u>Source(s):</u> <ul style="list-style-type: none"> ○ MMGRseg – AA1.8 ○ Project Risk Maturity Model – PRMM – Risk Response
BP05 - Define and perform risk treatment actions	<ul style="list-style-type: none"> • Add practices for specifying how to measure the effectiveness of controls and calculate residual risks. • Another fundamental issue will be the definition of <i>thresholds</i> and criteria based on historical data for their dynamic revision over time, choosing the proper updating frequency for any kind/family of risk issues. • <u>Source(s):</u> <ul style="list-style-type: none"> ○ MMGRseg - RT1.4, RT1.5 ○ IS RMM – EC.9



MAN.5 Risk Mgmt process	Suggested Improvements
BP06 - Monitor risks	<ul style="list-style-type: none"> • Add in order to standardize the monitoring of risks along time. <ul style="list-style-type: none"> • Need to formalize risk indicators/measures and transforming risks into opportunities (CSF's). • <u>Source(s)</u>: <ul style="list-style-type: none"> ○ MMGRseg - MA1.3 ○ RIMS RMM - PA#5 (Uncovering Risks) ○ IS RMM – AP.6 + TR.6 + CR.3 + SR.4, SR.1
BP07 - Take preventive or corrective actions	<ul style="list-style-type: none"> • Add practices/notes about the need for RCA (Root-Cause Analysis) as the basic TQM technique to use for determining the best choice from your own historical project/organizational data. • Communication is not only part of the strategy but – as an action – also the closing step for a corrective/preventive action, checking that the target audience will have properly received and acted against the requested action. • Tools could help in making easier the identification of recurring risk patterns and suggest possible countermeasures • <u>Source(s)</u>: <ul style="list-style-type: none"> • RIMS RMM – PA#4 • IS RMM – EC.7 • INCOSE RMM – Application driver



Conclusions & Next Steps



• Risk Management

- ✓ Risk is part of our daily lives and job, but too often managed from a qualitative perspective
- ✓ Risk cannot be managed if it's not tracked, measured and controlled
- ✓ Running a RCA (Root-Cause Analysis), Risk can be driver to manage first for assuring Safety
- ✓ Our target is create **Value** (Utility+Warranty), both for a product and a service to our Customers
- ✓ Thus, **Value** is the final goal to achieve in order to really improve our activities, but to manage Risk is fundamental for the Business (→ remember 'Moose Test' or ...)

• Models and Methods

- ✓ Many models, taxonomies and frameworks can be valid for improving our QMS (ISO 16949-compliant), better define value by a proper Risk Management and Assessment, for lowering TCO in projects
- ✓ E.g. Service Management BPs (e.g. ITIL or ISO 15504-8) are not only for IT services and can be a good framework for strategy and design suggestions not valid, as well as for reinforcing the design of an automotive project too

• LEGO (Living EnGineering prOcess) approach

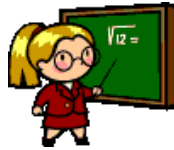
- <http://slideshare.re/nssLR8> [5WCSQ, Shanghai, Nov 2011]
- Choose and integrate the 'pieces of the puzzle' you need for your goals → the target is your QMS, not the model(s) you are using!

• Next Steps

- ✓ Identify further 'silver bullets' for leveraging the joint view of products and services, also from a business viewpoint
- ✓ Hybridize more models and techniques between the two communities for benchmarking purposes → looking e.g. to Safety and ISO 26262-related issue from a MCM-perspective



My brain is the key that sets my mind free.
(Henry Houdini, Magician, 1874-1926)





Thanks for your attention!
Grazie per la vostra attenzione!



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