



Fatores Humanos de Qualidade e ISO 12207

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Fatores Humanos de Qualidade

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- A **maneira como as pessoas trabalham** no desenvolvimento do Software tem impacto decisivo sobre os resultados.
 - Individualmente;
 - Em equipe.
- O trabalho realizado, em sua maioria, não é repetitivo.
 - O ideal é administrá-lo.

Exemplos com histórias comuns

- Após quase 10h de trabalho, João está saindo do escritório.
- São 19h e, nesse instante, o gerente o aborda.
 - Por que você está indo embora tão cedo, João?
 - [João leva um susto! E um turbilhão de pensamentos passa por sua cabeça]
 - [João pensa.. “estou **cansado**, gasto 1h para chegar em casa com transporte coletivo. Não estou me sentindo mais produtivo. **Se ficar, meu trabalho NÃO terá qualidade**. Se for embora, corro risco de ser demitido].
 - João, você sabia que o projeto está **atrasado**? Existe um motivo real para sair tão cedo?
 - Não tenho carro, preciso pegar um ônibus que está saindo agora, senão não tenho como ir para casa.
 - Ok! Vá, amanhã conversamos.

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- Em qualquer ambiente de trabalho *existem*:
 - Estresse;
 - Problemas de relacionamento;
 - Situações difíceis que afetam funcionários e suas tarefas;
 - Cronogramas que deixaram de ser funcionais;
 - Discussões entre membros da equipe;
 - Pressão combatida com mais pressão.

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- As empresas tem *condições* de:
 - Oferecer opções de *conforto* e *lazer*;
 - Investindo na *qualidade do trabalho* e *qualidade de vida*.
 - Contratar *psicólogos* para auxiliar no *tratamento interpessoal*;
 - *Remanejar* temporariamente funcionários;
 - *Liderança* adequada;
 - Permitir que *todos* os membros do grupo *conheçam* o produto a ser desenvolvido;
 - Reduzindo as *zonas de sombra*.



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- Mas, que acontece quando não são os funcionários, e sim, a **empresa** que está com **dificuldades**?
 - As histórias vistas **NÃO** ocorrem por problemas pessoais.
- Quando os **cronogramas** deixam de funcionar, temos:
 - Número de **defeitos** tornando-se **incontrolável**;
 - Não há certeza (ambiente **caótico**) do que deve ser feito para salvar o projeto;
 - **Pressão** é combatida com mais pressão.

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- Para uma mesma especificação, é possível criar diferentes programas.
 - Como **garantir** o desenvolvimento de uma **única solução**?
 - É preciso que todos no projeto se **comuniquem corretamente**.
 - É preciso ter **organização** do trabalho.
 - *Psicólogos sociais* verificaram: a **falha** de um ou mais membros em **dividir objetivos** do grupo afeta todo o grupo.

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- **Dividir um projeto de software** entre várias pessoas é **complicado**

- A existência de inúmeros itens a administrar, como:

- Recursos humanos
- Recursos financeiros
- Ferramentas
- Produtos intermediários.

Como tratar esses problemas?

Usando *metodologias, métodos e técnicas*: CMMI;
XP; Scrum; Entre outros.

No entanto, tudo isso exigirá uma boa **comunicação**.

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- Outro problema é **aumentar o número de pessoas** no projeto
 - Eleva-se o volume de **comunicação**;
 - Aumenta o **custo** do projeto.
 - O trabalho não é repetitivo, **depende do intelecto individual** de cada membro;
 - Há uma posse do produto desenvolvido;
 - Individualismo.
 - Pode-se citar o livro de Weinberg “*A Psicologia da Programação de Computadores*”

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- Outro problema frequente é **deixar hábitos anteriores** embora há existência de metodologias, métodos e técnicas padronizadas.
- Também é possível ter empresas de má qualidade bem-sucedidas.
 - Por que isso depende do produto construído.

“A busca por perfeição injustificada não é madura, mas infantil.”

Weinberg

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- No livro, “*Quality is Free*”, Crosby classificou estilos de gerência em 5 categorias.
 - Cada uma delas é uma maneira de compreender e administrar uma empresa.
 - Trabalha desde o nível *tentativa e erro* até *o modelo ideal de gerência*

Incerteza;
Despertar;
Esclarecimento;
Sabedoria;
Certeza.



Nível 1: Caótico;
Nível 2: Repetitivo;
Nível 3: Definido;
Nível 4: Gerenciado;
Nível 5: Otimizado.

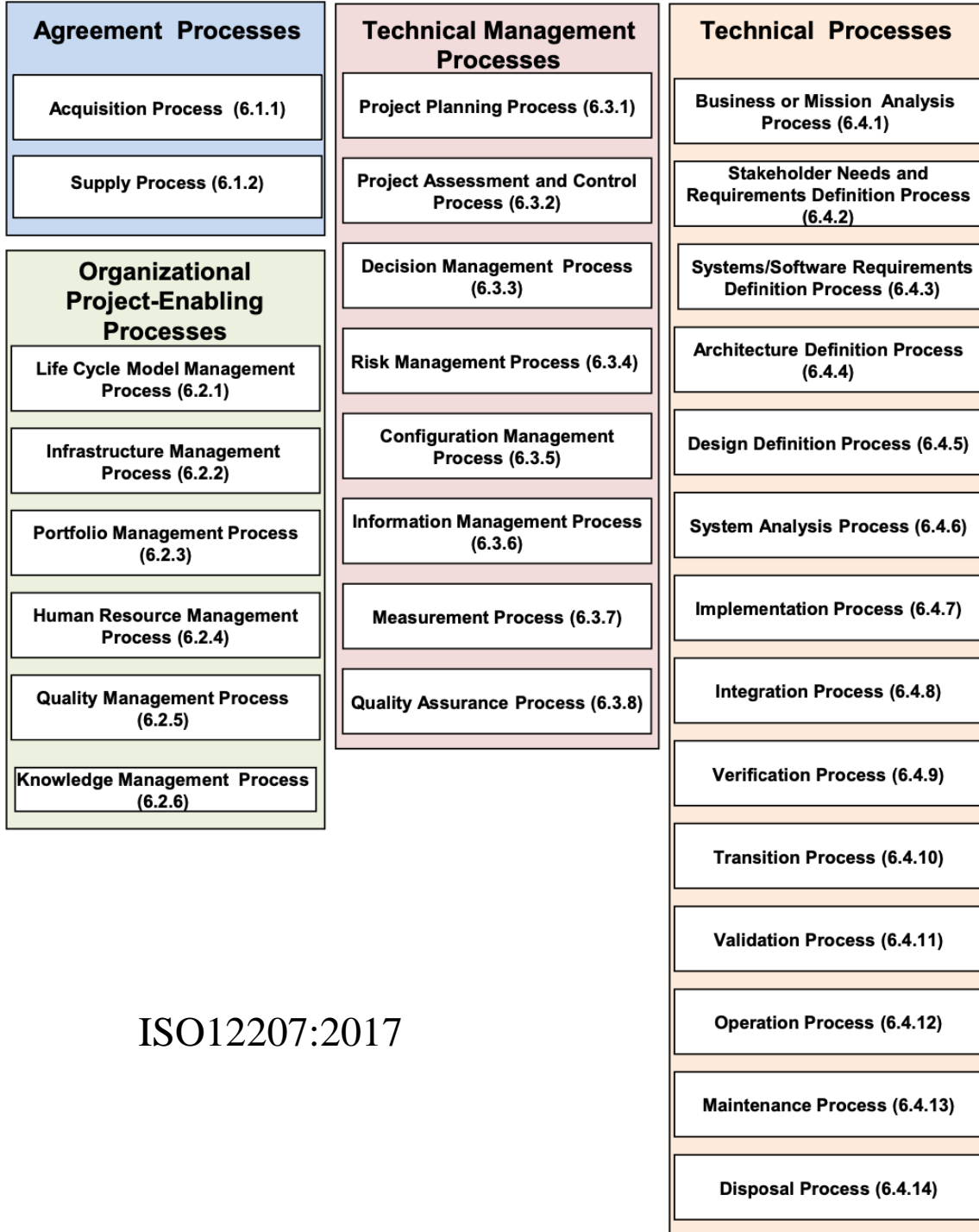
CMMI

ISO/IEC 12207

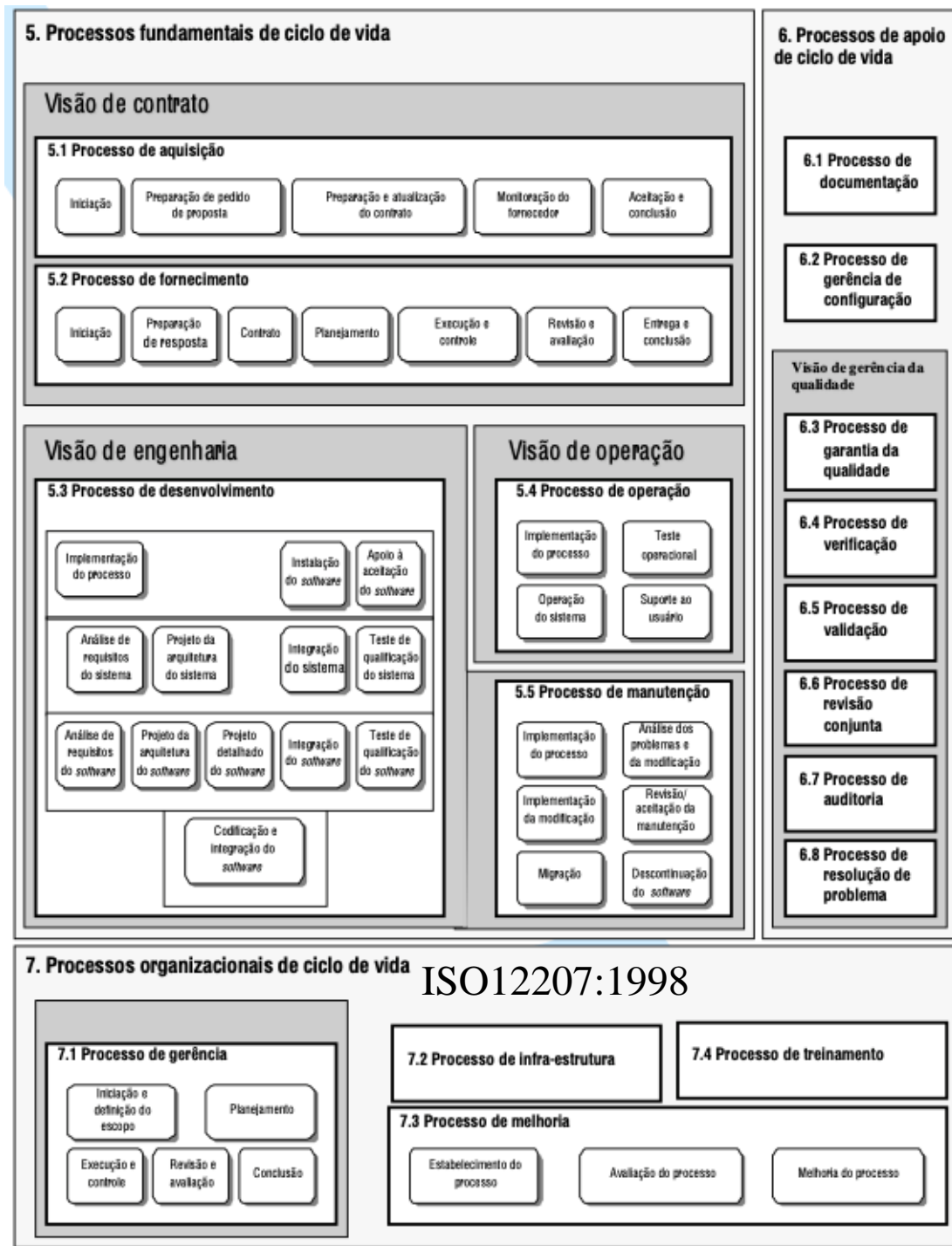
Systems and software engineering - Software life cycle processes

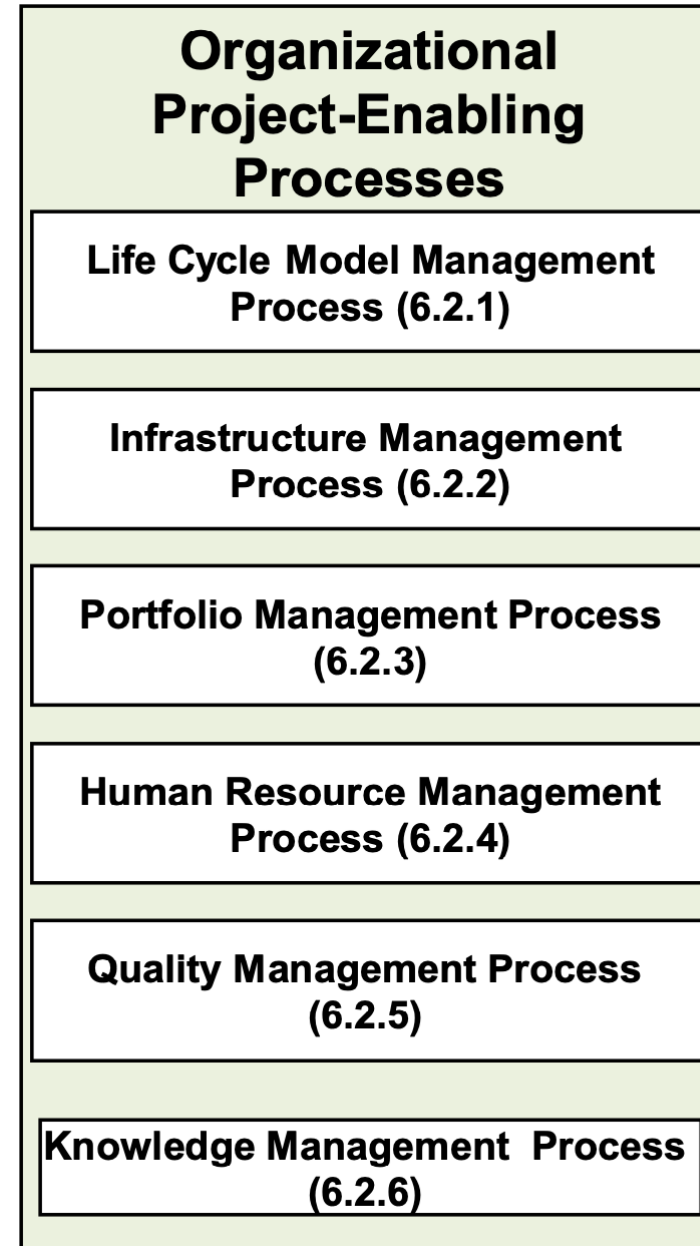
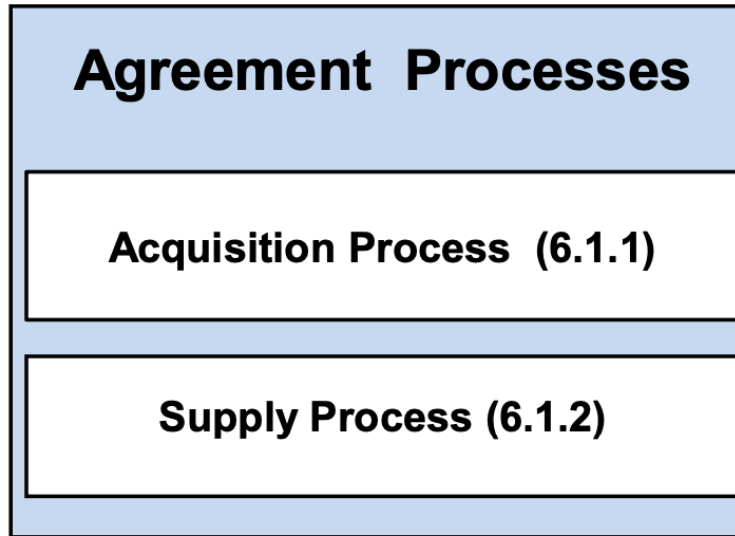
ISO/IEC 12207

- Framework comum para o Processo do Ciclo de Vida do Software
 - Vocabulário bem definido
 - Referenciável pela indústria
- O objetivo da especificação é **facilitar a comunicação** entre compradores, fornecedores e outros interessados no ciclo de vida de um produto de Software.



ISO12207:2017





Technical Management Processes

Project Planning Process (6.3.1)

Project Assessment and Control Process (6.3.2)

Decision Management Process (6.3.3)

Risk Management Process (6.3.4)

Configuration Management Process (6.3.5)

Information Management Process (6.3.6)

Measurement Process (6.3.7)

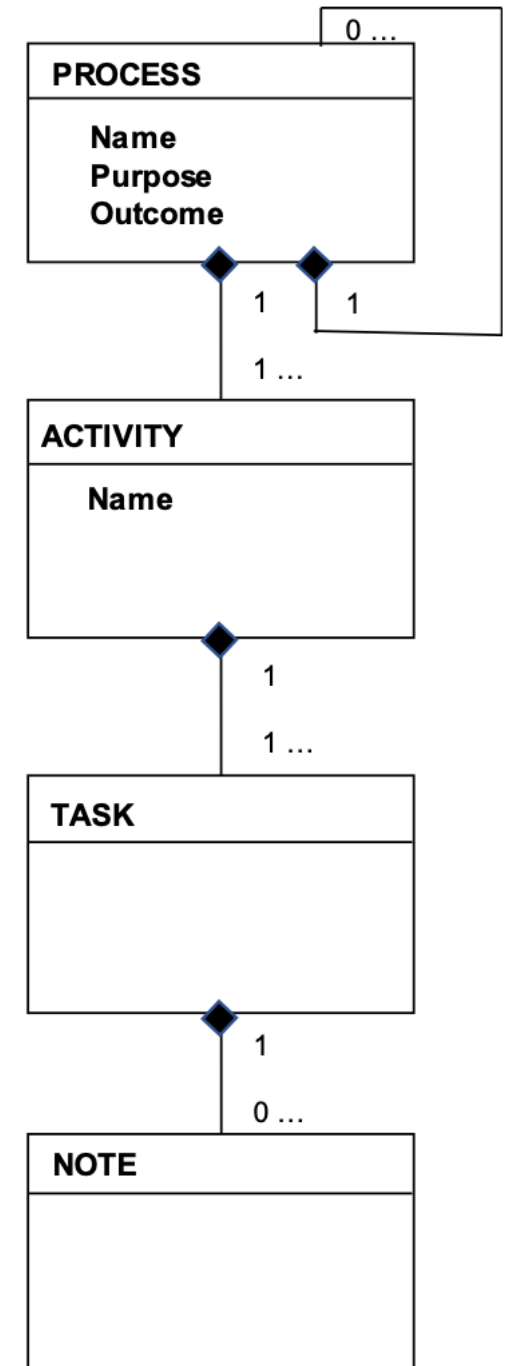
Quality Assurance Process (6.3.8)

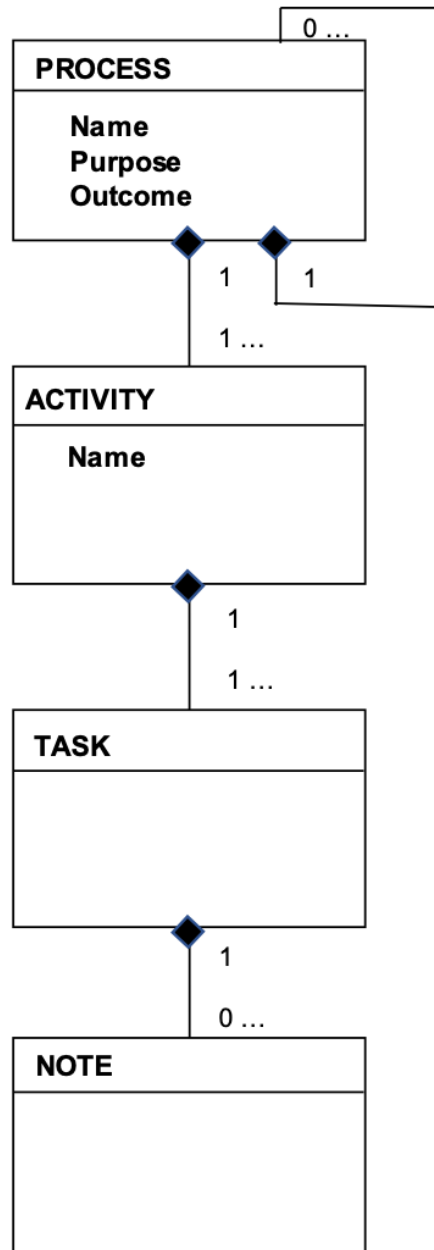
Technical Processes
Business or Mission Analysis Process (6.4.1)
Stakeholder Needs and Requirements Definition Process (6.4.2)
Systems/Software Requirements Definition Process (6.4.3)
Architecture Definition Process (6.4.4)
Design Definition Process (6.4.5)
System Analysis Process (6.4.6)
Implementation Process (6.4.7)

Integration Process (6.4.8)
Verification Process (6.4.9)
Transition Process (6.4.10)
Validation Process (6.4.11)
Operation Process (6.4.12)
Maintenance Process (6.4.13)
Disposal Process (6.4.14)

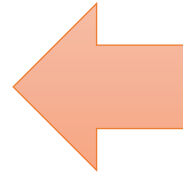
Componentes da ISO 12207

- Processo do Ciclo de Vida
 - Subprocessos
- Atividades do Processo:
Conjunto de *tarefas* que geram resultados,
as quais podem ser *apresentadas* como:
 - Requisitos (shall)
 - Recomendação (should)
 - Permissão (may)
- Notas da Tarefa





Para cada processo



Agreement Processes	Technical Management Processes	Technical Processes
Acquisition Process (6.1.1)	Project Planning Process (6.3.1)	Business or Mission Analysis Process (6.4.1)
Supply Process (6.1.2)	Project Assessment and Control Process (6.3.2)	Stakeholder Needs and Requirements Definition Process (6.4.2)
	Decision Management Process (6.3.3)	Systems/Software Requirements Definition Process (6.4.3)
	Risk Management Process (6.3.4)	Architecture Definition Process (6.4.4)
	Configuration Management Process (6.3.5)	Design Definition Process (6.4.5)
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		Validation Process (6.4.11)
		Operation Process (6.4.12)
		Maintenance Process (6.4.13)
		Disposal Process (6.4.14)

Organizational Project-Enabling Processes
Life Cycle Model Management Process (6.2.1)
Infrastructure Management Process (6.2.2)
Portfolio Management Process (6.2.3)
Human Resource Management Process (6.2.4)
Quality Management Process (6.2.5)
Knowledge Management Process (6.2.6)

6.1.2 Supply process

6.1.2.1 Purpose

The purpose of the Supply process is to provide an acquirer with a product or service that meets agreed requirements.

NOTE As part of this process, the agreement is modified when a change request affecting the terms of the agreement is agreed to by both the acquirer and supplier.

6.1.2.2 Outcomes

As a result of the successful implementation of the Supply process:

- a) An acquirer for a product or service is identified.
- b) A response to the acquirer's request is produced.
- c) An agreement is established between the acquirer and supplier.
- d) A product or service is provided.
- e) Supplier obligations defined in the agreement are satisfied.
- f) Responsibility for the acquired product or service, as directed by the agreement, is transferred.

6.1.2.3 Activities and tasks

The supplier shall implement the following activities and tasks in accordance with applicable organization policies and procedures with respect to the Supply process.

a) Prepare for the supply. This activity consists of the following tasks:

- 1) Determine the existence and identity of an acquirer who has a need for a product or service.

NOTE This is often generated through the Business or Mission Analysis process. For a product or service developed for consumers, an agent, e.g., a marketing function within the supplier organization, often represents the acquirer.

- 2) Define a supply strategy.

NOTE This strategy describes or references the life cycle model, risks and issues mitigation, and a schedule of milestones. It also includes key drivers and characteristics of the acquisition, such as responsibilities and liabilities; specific models, methods, or processes; level of criticality; formality; and priority of relevant trade factors.

b) Respond to a request for supply of products or services. This activity consists of the following tasks:

- 1) Evaluate a request for the supply of a product or service) to determine feasibility and how to respond.
- 2) Prepare a response that satisfies the solicitation.

c) Establish and maintain an agreement. This activity consists of the following tasks:

- 1) Negotiate an agreement with the acquirer that includes acceptance criteria.

NOTE This agreement ranges in formality from a written contract to a verbal agreement. The Supplier confirms that the requirements, delivery milestones, and acceptance conditions are achievable, that exception handling and agreement change management procedures and payment schedules are acceptable, and that they establish a basis for executing the agreement without unnecessary risks. Issues are discussed and resolved during negotiation, after which the acquirer and supplier accept the terms of an agreement and the agreement commences. For a contract, this occurs when the contract is signed.

- 2) Identify necessary changes to the agreement.

NOTE In requesting a change to the agreement, the acquirer or the supplier details its specifications, rationale, and background.

- 3) Evaluate impact of changes on the agreement.

NOTE Any change is investigated for impacts to project plans, schedule, cost, technical capability, or quality. A change can be handled within the existing agreement, can require a modification to the agreement, or can require a new agreement.

- 4) Negotiate the agreement with the acquirer, as necessary.

NOTE Changes to agreement terms are negotiated between the supplier and acquirer. This includes changes due to changing market context. Negotiation occurs for the initial agreement, and as required for any changes. Changed agreements are based on the required change and identified impacts.

- 5) Update the agreement with the acquirer, as necessary.

NOTE The result of the agreement modification is incorporated into the project plans and communicated to all affected parties.

d) Execute the agreement. This activity consists of the following tasks:

- 1) Execute the agreement according to the established project plans.

NOTE A supplier sometimes adopts, or agrees to use, acquirer processes.

- 2) Assess the execution of the agreement.

NOTE This includes confirmation that all parties are meeting their responsibilities according to the agreement. The Project Assessment and Control process is used to evaluate projected cost, schedule, performance, and the impact of undesirable outcomes on the organization. The change management activity of the Configuration Management process is used to control changes to the system elements. This information is combined with other assessments of the execution of the terms of the agreement. If execution of the agreement does not result in an acceptable product or service, the acquirer or supplier can terminate the agreement as allowed in its terms.

e) Deliver and support the product or service. This activity consists of the following tasks:

- 1) Deliver the product or service in accordance with the agreement criteria.

NOTE As stated in the agreement, acceptance criteria, such as acceptance testing, relate to how the product or service will satisfy its intended use in its operational environment. Unaddressed exceptions, e.g., disputes over conduct of acceptance testing or product suitability for intended use, are a matter for agreement provisions relating to disputes, arbitration or applicable law and regulation.

- 2) Provide assistance to the acquirer in support of the delivered product or service, per the agreement.

- 3) Accept and acknowledge payment or other agreed consideration.

- 4) Transfer the product or service to the acquirer, or other party, as directed by the agreement.

- 5) Close the agreement.

NOTE 1 The project is closed by the Portfolio Management process.

NOTE 2 Agreements can specify the conditions under which the agreement will be terminated by either party, e.g., unexpected changes in strategy or available funding, or lack of satisfactory progress.

6.2 Organizational Project-Enabling processes

The Organizational Project-Enabling processes help ensure the organization's capability to acquire and supply products or services through the initiation, support and control of projects. These processes provide resources

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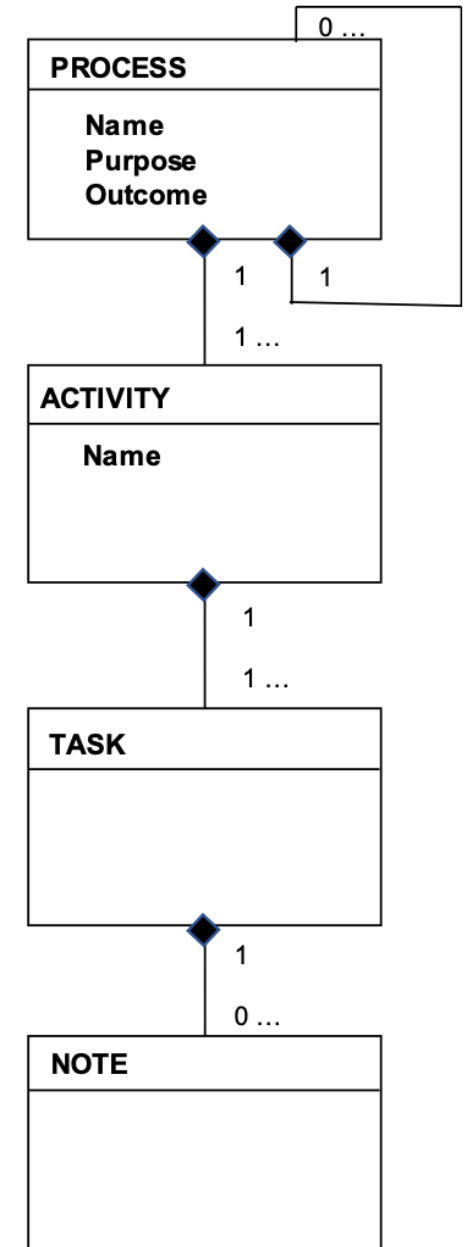
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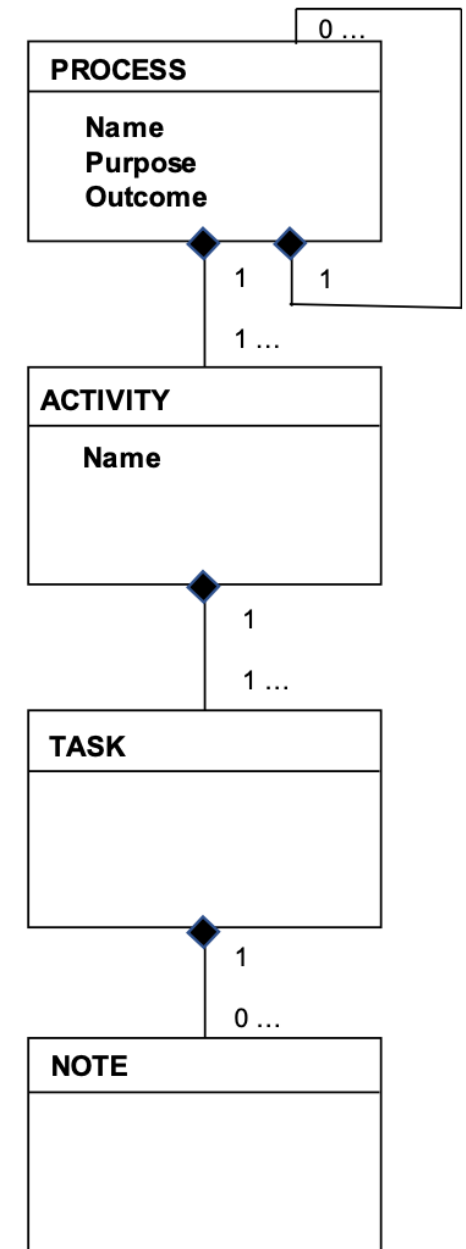
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Baseline (linhas de base)

- Uma **especificação** ou **produto** que foi **formalmente revisada** e sobre a qual se chegou a um acordo e que, a partir desse momento, servira de base para o desenvolvimento posterior, e que pode ser alterada apenas através de um procedimento formal de mudança.

6.3.5 Configuration Management process

6.3.5.2 Outcomes

As a result of the successful implementation of the Configuration Management process:

- a) Items requiring configuration management are identified and managed.
- b) Configuration **baselines** are established.
- c) Changes to items under configuration management are controlled.
- d) Configuration status information is available.

Estágio (*Software life cycle stages*)

- **Período** dentro do ciclo de vida de uma entidade (*when*) que relata o estágio de sua descrição ou realização
- Podem ser **sobrepostos**

ISO/IEC 12207

- Escopo
 - Estabelece um **framework comum** para o ciclo de vida do Software
 - Define a **terminologia/vocabulário** (*what* e *why*)
- Aplicabilidade
 - Compra
 - Fornecimento
 - Desenvolvimento
 - Operação
 - Manutenção
 - Descarte, retirada (produtos ou partes de Software)

ISO/IEC 12207

- Limites
 - NÃO detalha **métodos** ou **procedimentos** necessários (*how and when*) para alcançar os objetivos e/ou resultados de um processo
 - NÃO detalha a **documentação** solicitada
 - NÃO **prescreve**:
 - **Modelos** de ciclo de vida de Software,
 - **Metodologias** de desenvolvimento
 - **Métodos** ou
 - **Técnicas**

Referências

- ISO/IEC 12207:2021 (português):
<https://drive.google.com/file/d/17htiotEuQ0mzuRugVO-R1pePI81pZ9XJ/view?usp=sharing>
- ISO/IEC 12207:2017 (ingles):
<https://drive.google.com/file/d/1lJ4jCOhIEWI9KadlIf3CRO9ykkvarj91/view?usp=drivesdk>
- Pressman, R. S., & Maxim, B. R. (2021). *Engenharia de software: Uma abordagem profissional*. 9ª edição. McGraw Hill Brasil.
- Myers, G. J., Sandler, C., & Badgett, T. (2011). *The art of software testing*. John Wiley & Sons.
- ANSI/IEEE1028, An American National Standard, IEEE Standards for Software Reviews and Audits. ANSI/IEEE 1028 (2008)
- Fagan, M. E. (1976). Design and code inspections to reduce errors in program development. *IBM Systems Journal*, 15(3), 182-211.
- McConnell, S. (2005). *Code Complete: Um guia prático para a construção de software*. Bookman.

Referências

- Koscianski, A., & dos Santos Soares, M. (2007). *Qualidade de Software-2ª Edição: Aprenda as metodologias e técnicas mais modernas para o desenvolvimento de software*. Novatec Editora.
- Zanin, A., Pasqual Júnior, P. A, Rocha, B. C, Barreto, J. S, Gonçalves, P. F, Córdova Júnior, R. S. (2020). *Qualidade de Software*. Soluções Educacionais Integradas.
- Pezzè, M.; Young, M. (2008) *Teste e Análise de Software: Processos, princípios e técnicas*. 1ª ed. [S.1]: Bookman.
- Sommerville, I. (2011) *Engenharia de Software*. 9ª ed. São Paulo: Pearson,

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