

# Converse com modelos de Sistemas Dinâmicos em Linguagem Natural

Março 2021

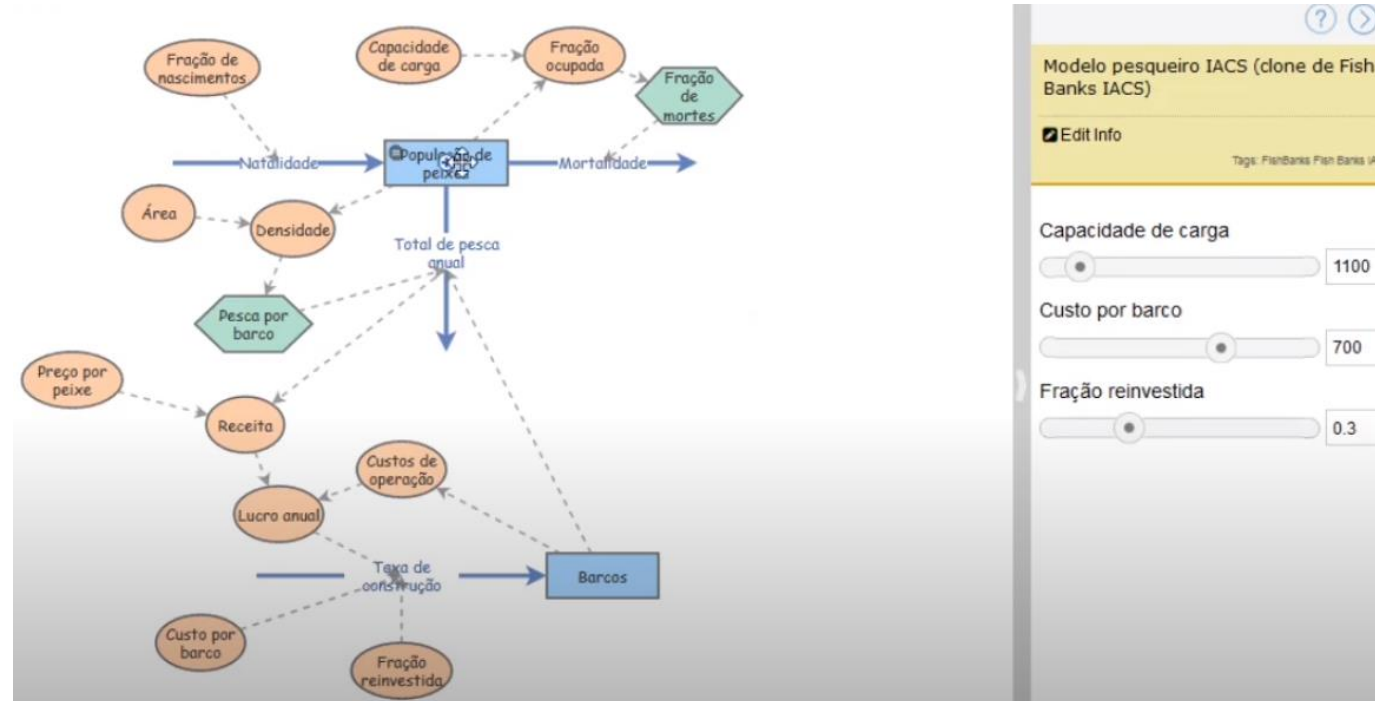
Orientando: Giseldo

Orientador: Dr. Tárcio e Dr. Antão

# Justificativa

- Os stakeholders (patrocinadores) no apoio a tomada de decisão não compreendem bem como funciona um sistema dinâmico.
- Mesmo após modelado o sistema dinâmico (pelo analista) o stakeholder principal ainda pode ter dúvidas e gostaria de conversar em linguagem natural sobre o modelo

# Justificativa



- Exemplo dúvidas do stakeholder
  - Se for aumentado o número de barcos para o dobro o que acontece com o estoque de peixes?
  - Se eu diminuir os meus custos de operação em 10% isso impacta a densidade dos peixes?
  - Como fica o meu lucro atual se diminuir pela metade o custo por barco?

# Questão de pesquisa

Como permitir que os stakeholders (com poder de decisão) possam discutir sobre o sistema dinâmico para tirar insights sem o custo de uma interação humana?

# Objetivo

Permitir que o stakeholder principal possa conversar sobre um sistema dinâmico qualquer sem o custo humano

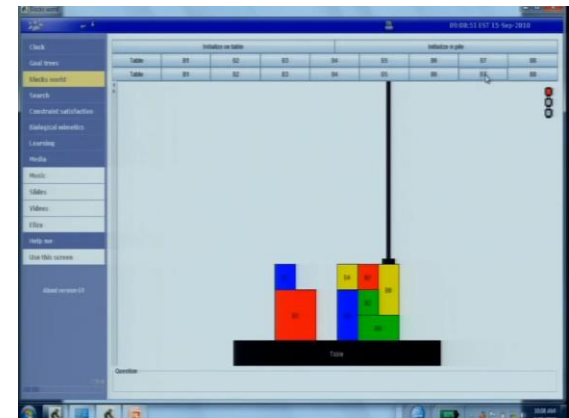
Secundário:

- *Adaptar os elementos BPMN para mapear sistemas dinâmicos (criar um nova notação filha do BPMN, ressignificando elementos. AKA: BPMN2AIML)*
- (\*) Mapear um sistema dinâmico para uma base de diálogo (cérebro do chatbot)
- Disponibilizar um chatbot que entende um sistema dinâmico e conversa sobre, para prova de conceito

# Objetivo Secundário

- (\*) Mapear um sistema dinâmico para uma base de diálogo (cérebro do chatbot)
  - Quais técnicas de raciocínio serão necessárias para explicar o sistema dinâmico?
    - Fazer o que Terry Winograd fez com os blocos para Sistemas Dinâmicos na aula de Patrick Winston

[https://www.youtube.com/watch?v=leXa7EKUPFk&list=PLUI4u3cNGP63gFHB6xb-kVBiQHYe\\_4hSi&index=3](https://www.youtube.com/watch?v=leXa7EKUPFk&list=PLUI4u3cNGP63gFHB6xb-kVBiQHYe_4hSi&index=3) (2:04 até 6:02)



# Referencial

## From Process Models to Chatbots

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**Abstract.** The effect of digital transformation in organizations needs to go beyond automation, so that human capabilities are also augmented. A possibility in this direction is to make formal representations of processes more accessible for the actors involved. On this line, this paper presents a methodology to transform a formal process description into a conversational agent, which can guide a process actor through the required steps in a user-friendly conversation. The presented system relies on dialog systems and natural language processing and generation techniques, to automatically build a chatbot from a process model. A prototype tool – accessible online – has been developed to transform a process model in BPMN into a chatbot, defined in Artificial Intelligence Marking Language (AIML), which has been evaluated over academic and industrial professionals, showing potential into improving the gap between process understanding and execution.

## 1 Introduction

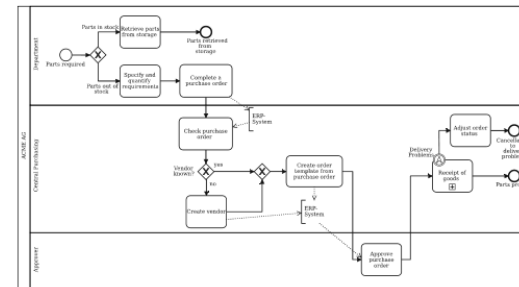


Fig. 1. BPMN representation of the 'procure parts' business process

Second, a tailored finite state automata representation of the underlying process model is used so that the conversation state is manmionous dependine on the

Bot: Hi, which process do you want to see?  
You: I'm interested in the procure parts process.  
Bot: The process begins when the parts are required by the Department.  
What do you want to do now?  
You: Who checks the purchase order?  
Bot: The Central Purchasing checks the purchase order.  
You: Follow process.  
Bot: Parts out of stock/Parts in stock ?  
You: Parts out of stock.  
Bot: The Department specifies and quantifies the requirements.  
You: Next.  
Bot: The Department completes the purchase order.  
You: Next.  
Bot: The Central Purchasing checks the purchase order. Vendor known?  
You: Yes.  
Bot: The Central Purchasing creates the order template from purchase order.  
You: Who did you say before that checks the purchase order?  
Bot: The Central Purchasing checks the purchase order.  
You: ok.  
Bot: The Approver approves the purchase order.  
You: Next.  
Bot: After that, the Central Purchasing executes process called "receipt of goods".

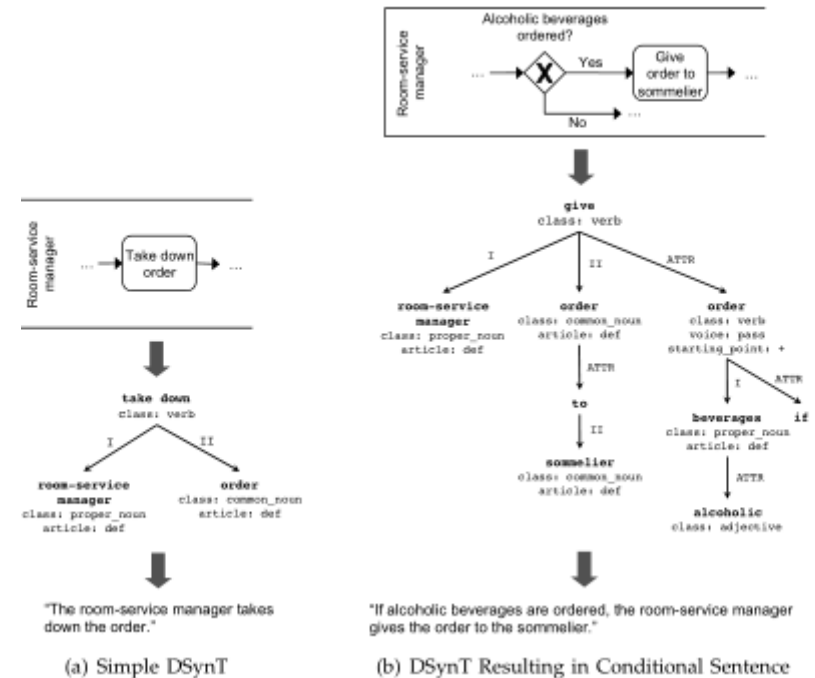
# Referencial

## Supporting Process Model Validation through Natural Language Generation

Henrik Leopold, Jan Mendling, and Artem Polyvyanyy

**Abstract**—The design and development of process-aware information systems is often supported by specifying requirements as business process models. Although this approach is generally accepted as an effective strategy, it remains a fundamental challenge to adequately validate these models given the diverging skill set of domain experts and system analysts. As domain experts often do not feel confident in judging the correctness and completeness of process models that system analysts create, the validation often has to regress to a discourse using natural language. In order to support such a discourse appropriately, so-called verbalization techniques have been defined for different types of conceptual models. However, there is currently no sophisticated technique available that is capable of generating natural-looking text from process models. In this paper, we address this research gap and propose a technique for generating natural language texts from business process models. A comparison with manually created process descriptions demonstrates that the generated texts are superior in terms of completeness, structure, and linguistic complexity. An evaluation with users further demonstrates that the texts are very understandable and effectively allow the reader to infer the process model semantics. Hence, the generated texts represent a useful input for process model validation.

**Index Terms**—Business Process Model Validation, Natural Language Text Generation, Verbalization



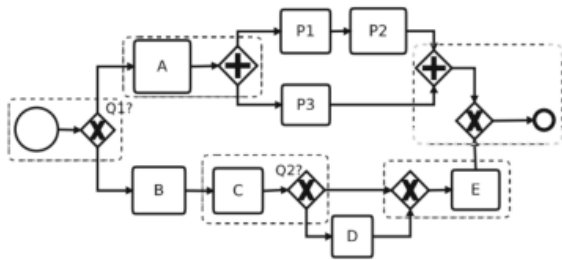


# Metodologia

- Criar (ou estado da arte) uma técnica para mapear um sistema dinâmico em uma base de dialogo
- Construir um chatbot que come (entende) um sistema dinâmico qualquer e conversa sobre ele
- Carregar os sistemas dinâmicos desenhados na pesquisa do Bezerra (2015) e conversar sobre ele
- Disponibilizar o chatbot para que mais alguns sistemas dinâmicos de outras áreas possam ser carregados e disponibilizar para alguns usuários de negócio
- Questionário com os usuários de negócio da usabilidade e qualidade da interação

# Resultados Esperados

- Agregar maior valor ao processo de modelagem causal
- Disseminar cada vez o uso do Sistema Dinâmico nas organizações
- Algoritmo de conversão (*BPMN para SD*) e conversão Sistema Dinâmico para AIML



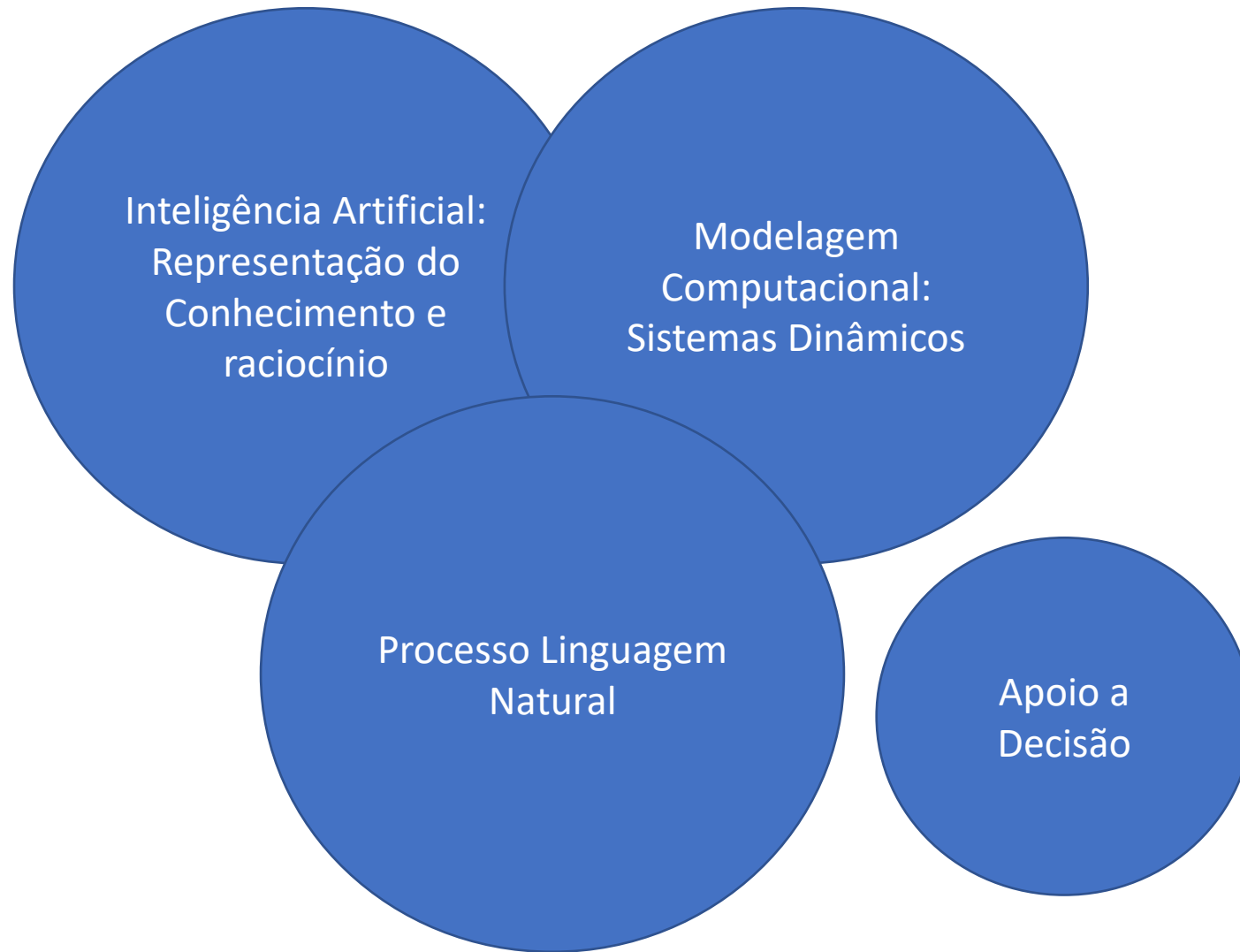
Algorithm 2 Algoritmo que converte BPMN em AIML. Fonte: o Autor (2020)

```
1: for aresta in arestas do
2:   if aresta.ant is evento.de.inicio then
3:     pattern ← aresta.ant.name
4:     template ← aresta.pos.name
5:     srai ← aresta.pos.id
6:   else if aresta.pos is evento.de.fim then
7:     pattern ← aresta.ant.id
8:     template ← aresta.pos.name
9:   else if aresta.ant is atividade and aresta.pos is atividade then
10:    pattern ← aresta.ant.id
11:    template ← aresta.pos.name
12:    srai ← aresta.pos.id
13:   else if aresta.ant is atividade and aresta.pos is gateway then
14:    pattern ← aresta.ant.id
15:    template ← aresta.pos.name
16:   else if aresta.ant is exclusivgateway then
17:     that ← aresta.ant.name
18:     pattern ← aresta.name
19:     template ← aresta.pos.name
20:     srai ← aresta.pos.id
21:   new categoria (that, template, pattern, srai)
```

PROPOSTA

```
<aiml>
  <topic name="STARTEVENT0ST4L3P">
    <category>
      <pattern>TASK1IDGTGM</pattern>
      <template>SOU UM ROBO-
        <srai>TASK1Y5VME</srai>
      </template>
    </category>
    <category>
      <pattern>TASK1Y5VME</pattern>
      <template>
        <think>
          <set name="topic"></set>
        </think>
        FIM-
      </template>
    </category>
  </topic>
  <category>
    <pattern>OI</pattern>
    <template>
      <think>
        <set name="topic">STARTEVENT0ST4L3P</set>
      </think>
      OI TODO BEM-
      <srai>TASK1IDGTGM</srai>
    </template>
  </category>
</aiml>
```

# Temas



# Referências

- Tese “Capturando a Dinâmica da Gestão da Terceirização de Tecnologia da Informação para o Apoio a Decisões: Um estudo de caso em organizações públicas” Bezerra, 2015.
- Livro “Software Process Dynamic” Madachy 2007

# Links

- <http://chatbotari.herokuapp.com/>
- <https://bpmn.io/>
- [\(431\) Prática de modelagem de sistemas dinâmicos - Insight Maker – YouTube](#)
- <https://insightmaker.com/>