Developing a Pan American Hub for Environmentally and Socially Compatible Mining

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System Thinking Approach to Environmental Emergencies in Mining

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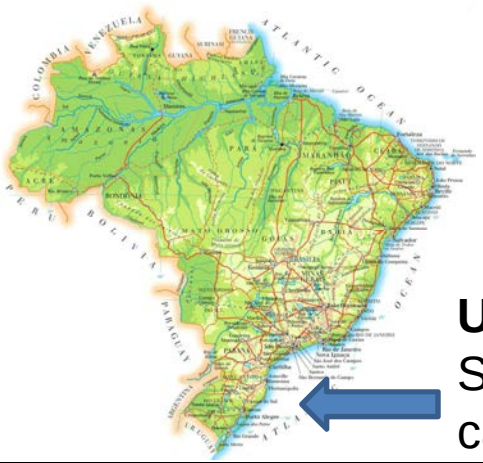
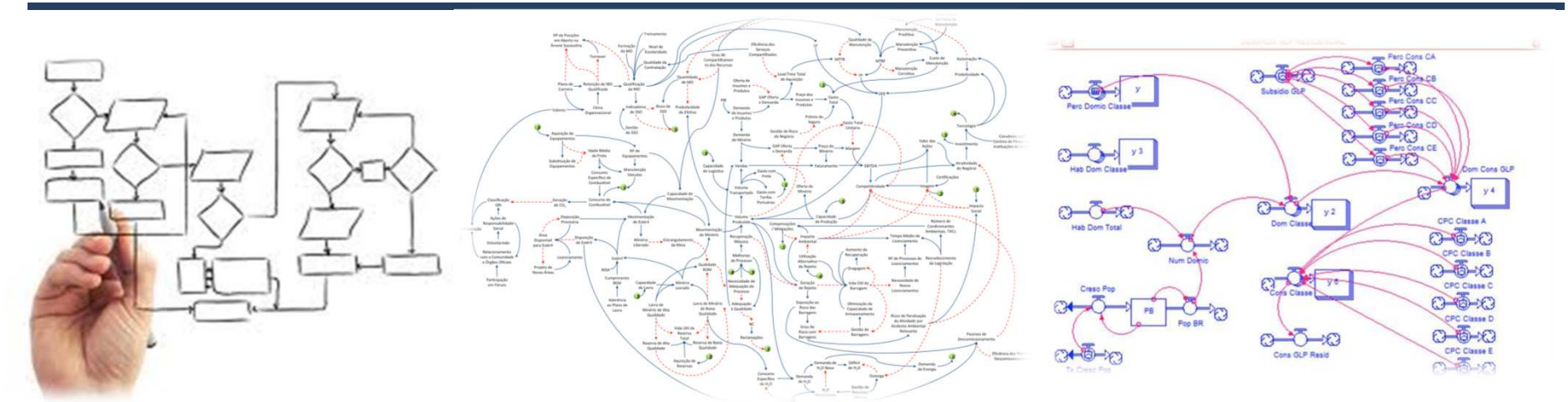
Ph.D in Operational Research (Lancaster University, U.K); MBA and B.A in Business Administration (Federal University of Rio Grande do Sul, Brazil). Coordinator of GMAP Research Group, over 20 years of experience in large national and international projects in Modelling. Co-author of the books “Pensamento Sistêmico Caderno de Campo” and “Gerenciamento da Produtividade Aplicado aos Correios” and Pesquisa Operacional. Main interests: Mining, Sustainability, Productivity, Systems Thinking, Computer Simulation, Strategic Planning, Theory of Constraints, Production Planning and Programming in large Brazilian companies.

UNISINOS

- The **University of the Sinos Valley** (Universidade do Vale do Rio dos Sinos) is a leading private university in Brazil. On its campus, comprising a total area of more than 223.75 acres, there is an environmentally preserved area with gardens and lakes, comprising up to 170,320.94 yd², which hosts several species of animals.



UNISINOS is located in São Leopoldo, in the Sinos Valley, in the State of Rio Grande do Sul, in the South of Brazil, near the State capital (Porto Alegre).



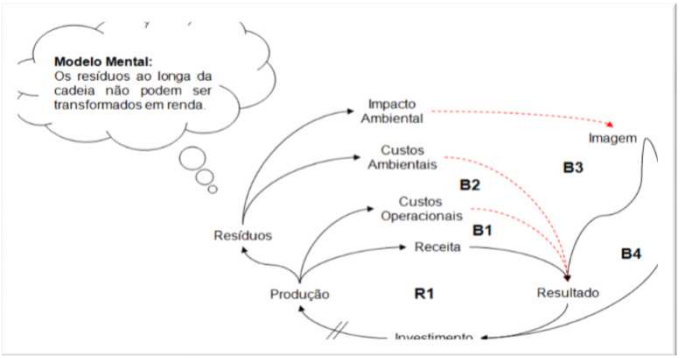
GMAP | UNISINOS
Research Group in Modelling for Learning

System Thinking

It aims to evaluate the impacts of our decision in time and space.

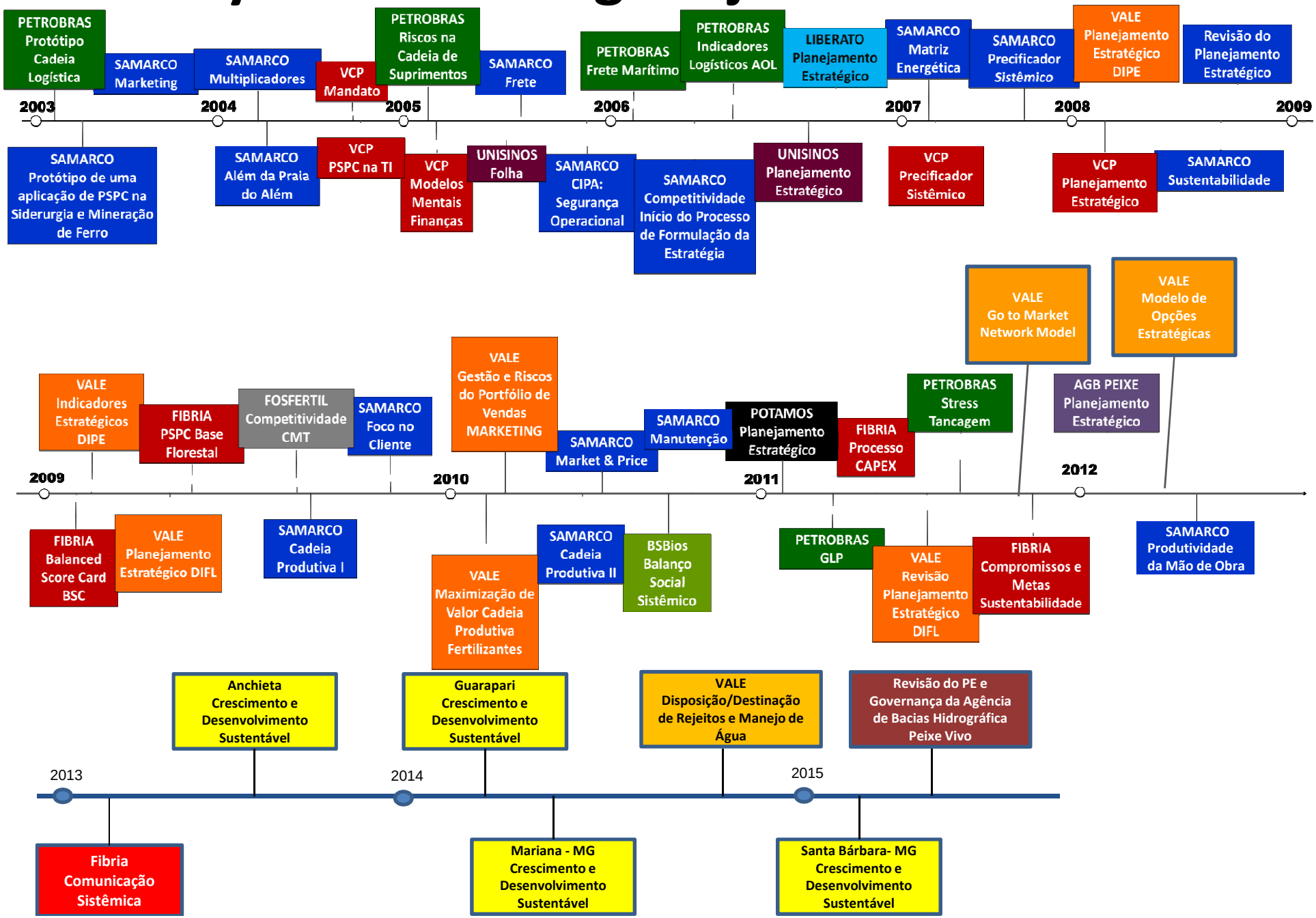
It is not about...

- Focusing in events;
- Foretell the future;
- Reactive problem solving;



- Explore short and long term impacts of alternative or newly proposed solutions or actions.
- Visualize multiple future scenarios
- Test the viability of proposed solutions.
- Construct a shared vision
- Increase creative discussion.
- Identify or clarify a problem.
- Promote inquiry and challenge pre-conceived ideas.
- Bring out the validity of multiple perspectives.
- Make assumptions explicit.
- Shift out major issues and factors.
- Find the systemic causes of complex problems.

System Thinking Projects Time Line



Traditional Approach of Evaluation of Potential Impacts from Accidents caused by Dam Rupture.

Recent history reveals that the methods and references used for the elaboration of locational studies of new heightening structures, Dam Break studies and their respective impacts as well as their corresponding Accident Emergence Plan (which have been and are being exhaustively elaborated) although NECESSARY, they have been INSUFFICIENT as approaches to attend their purpose.

Systemic Evaluation of the Impacts of the Dam Rupture

Systemic evaluation of the potential impacts, in time and space, under the perspective of distinct scenarios, arising from large accidents due to dam ruptures, has the objective to offer a robust Action Plan which mitigates the overall business risks.

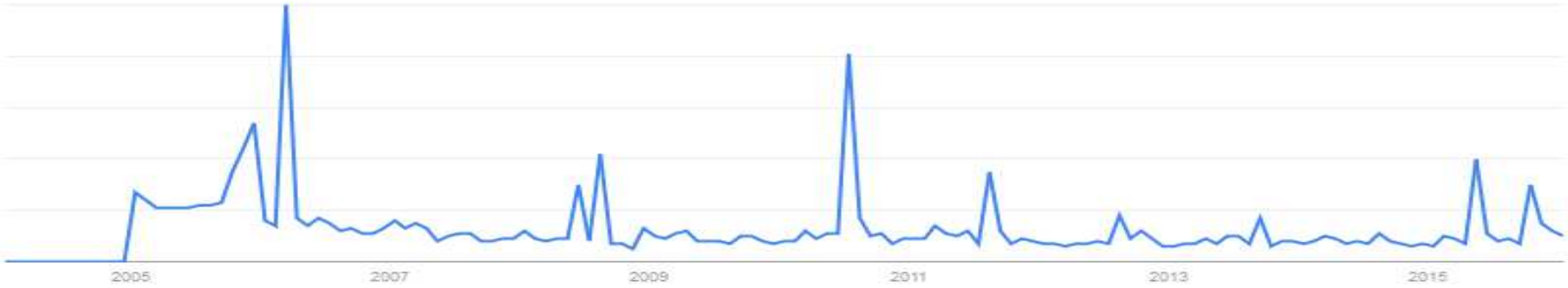
dam break
Termo de pesquisa

+ Adicionar termo

Google Trends

Interesse com o passar do tempo

Títulos das notícias Previsão

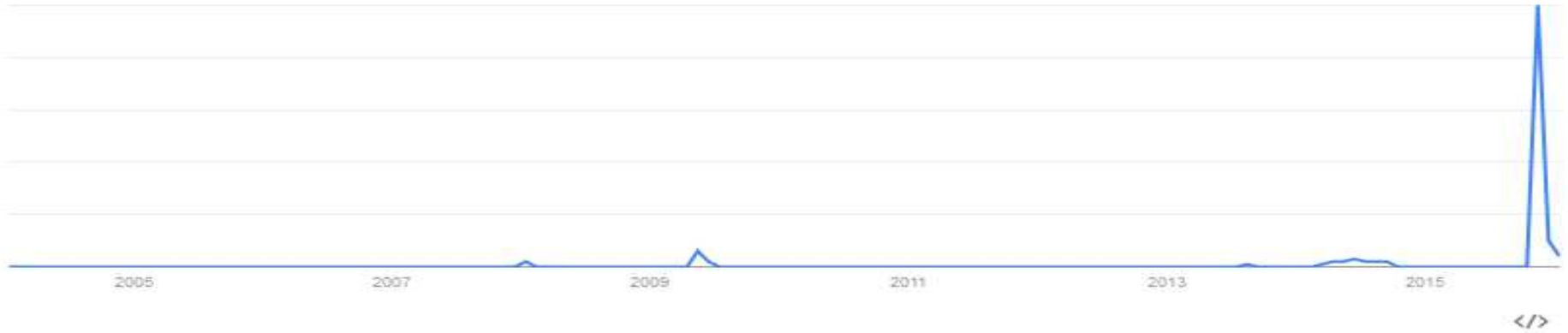


rompimento barragem
Termo de pesquisa

+ Adicionar termo

Interesse com o passar do tempo

Títulos das notícias Previsão



Where are the relationships..

Domestic Violence

Dam Break

Productivity in Agriculture

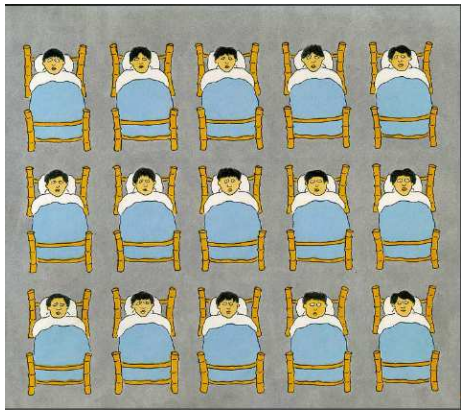
Mineral Water Distribution

but before exploring that, another, old but true story ... mysteries in the island of Borneo .....

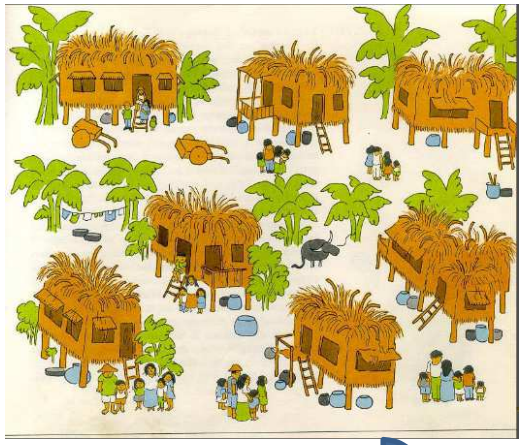
- *what relationships exist among :*
  - *Cases of bubonic plague...*
  - *Falling roofs...*
  - *Death of fish*

Problems:

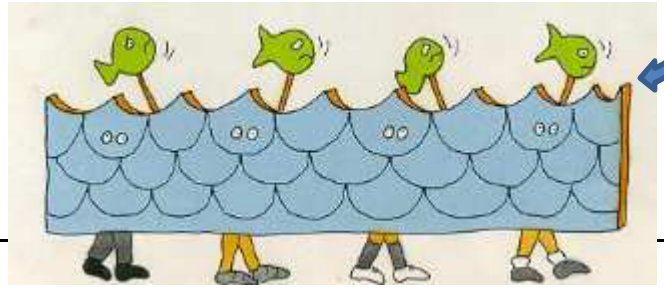
1. **Death of the population caused by the bubonic plague**

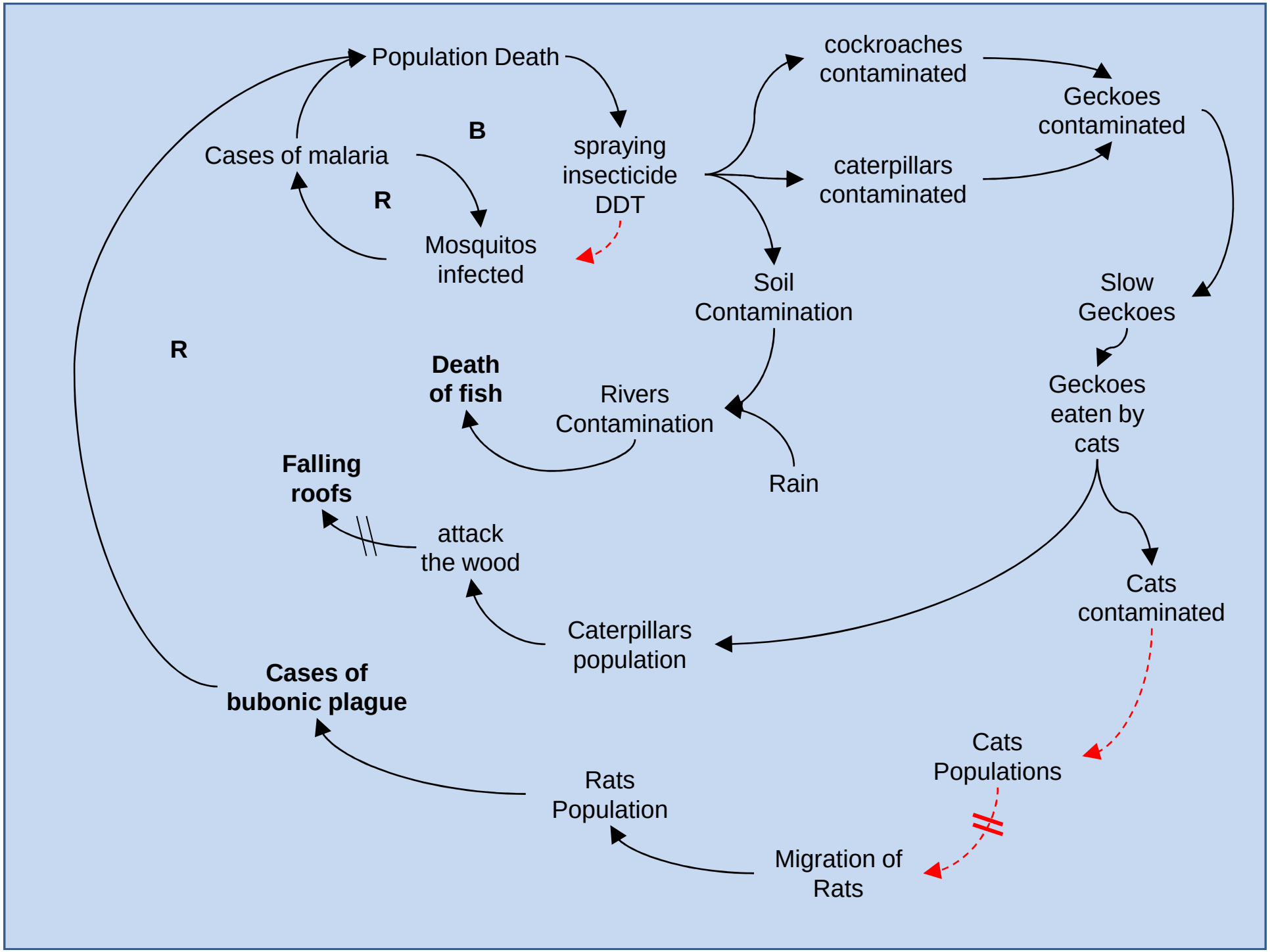


2. **Falling Roofs**



3. **Death of fish**




Population Death
cockroaches contaminated
Geckoes contaminated
B
Cases of malaria
spraying insecticide DDT
caterpillars contaminated
R
Mosquitos infected
Soil Contamination
Slow Geckoes
R
Death of fish
Rivers Contamination
Geckoes eaten by cats
Rain
Falling roofs
attack the wood
Cats contaminated
Caterpillars population
Cases of bubonic plague
Cats Populations
Rats Population
Migration of Rats

The Day it Rained Cats in to Borneo in the 1950s...

Parachuting Cats Into Borneo[1]

In the early 1950s, there was an outbreak of a serious disease called malaria amongst the Dayak people in Borneo. The World Health Organization tried to solve the problem. They sprayed large amounts of a chemical called DDT to kill the mosquitoes that carried the malaria. The mosquitoes died and there was less malaria. That was good. However, there were side effects. One of the first effects was that the roofs of people's houses began to fall down on their heads. It turned out that the DDT was also killing a parasitic wasp that ate thatch-eating caterpillars. Without the wasps to eat them, there were more and more thatch-eating caterpillars. Worse than that, the insects that died from being poisoned by DDT were eaten by gecko lizards, which were then eaten by cats. The cats started to die, the rats flourished, and the people were threatened by outbreaks of two new serious diseases carried by the rats, sylvatic plague and typhus. To cope with these problems, which it had itself created, the World Health Organization had to parachute live cats into Borneo.

http://pzweb.harvard.edu/ucp/curriculum/ecosystems/s6_res_borneo.pdf

Essence of the Approach

- **Beyond** the merely **legal** requirements;
- **Strategic** document for the **internal** positioning of the company;
- **Constructed** in a **collaborative**, **multidisciplinary** and **dynamic** way;
- **Identifies** the main **systemic impacts,** in time and space, resulting from the **dam's rupture** ;
- **Visualizes** possible s**cenarios** resulting from the rupture;
- Defines the **scope** of the do a set of **actions** to be taken;
- Defines the **governance** in the **development** of the defined actions;
- **Incorporates** a post-rupture **operational continuity**;
- Allows for the **strategic reflection by revising the operations model;**
- **Reduces the rupture's negative impacts** .

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Thank you!!!
Gracias!!!
Obrigado!!!

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