Project Management Report from São Paulo

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Relation between project phases and risks in recent disasters

The year 2019 began in Brazil with a series of major disasters in buildings and engineering works. We relate three of these events below.

Brumadinho dam disruption - in January, the tailings dam of the Vale Mining company in Brumadinho / MG with 11.7 million m³ of tailings ruptured, resulting in almost 300 people dead or missing, in addition to being one of the biggest environmental disasters in Brazil.

Photo: Fire Department

Fire at Ninho do Urubú - in February there was a fire in junior players lodging of the C.R. Flamengo soccer team in Rio de Janeiro / RJ, leaving 10 people dead.

Photo: Ricardo Moraes / Reuters

Collapsing two buildings in Muzema - in April two buildings collapsed in the community of Muzena in Rio de Janeiro / RJ leaving 24 people dead.

Photo: Ricardo Moraes / Reuters

These disasters and accidents were not isolated or casual. In the last four years other media-described disasters have also occurred in engineering works and buildings. The most publicized by the media were:

In 2015, the Mariana tailings dam was disrupted leaving 19 dead people and the country's biggest environmental disaster.

Photo: Tulio Santos / EM / D.A. Press

In 2016, the Tim Maia cycle track collapsed in Rio de Janeiro / RJ due to the occurrence of high waves, leaving two people dead.

Photo: Cheistophe Simon / AFP

In 2018 occurred the fire and collapse of the building Wilson Paes de Almeida in São Paulo / SP occupied by homeless people resulting in 7 people dead and 291 families homeless.

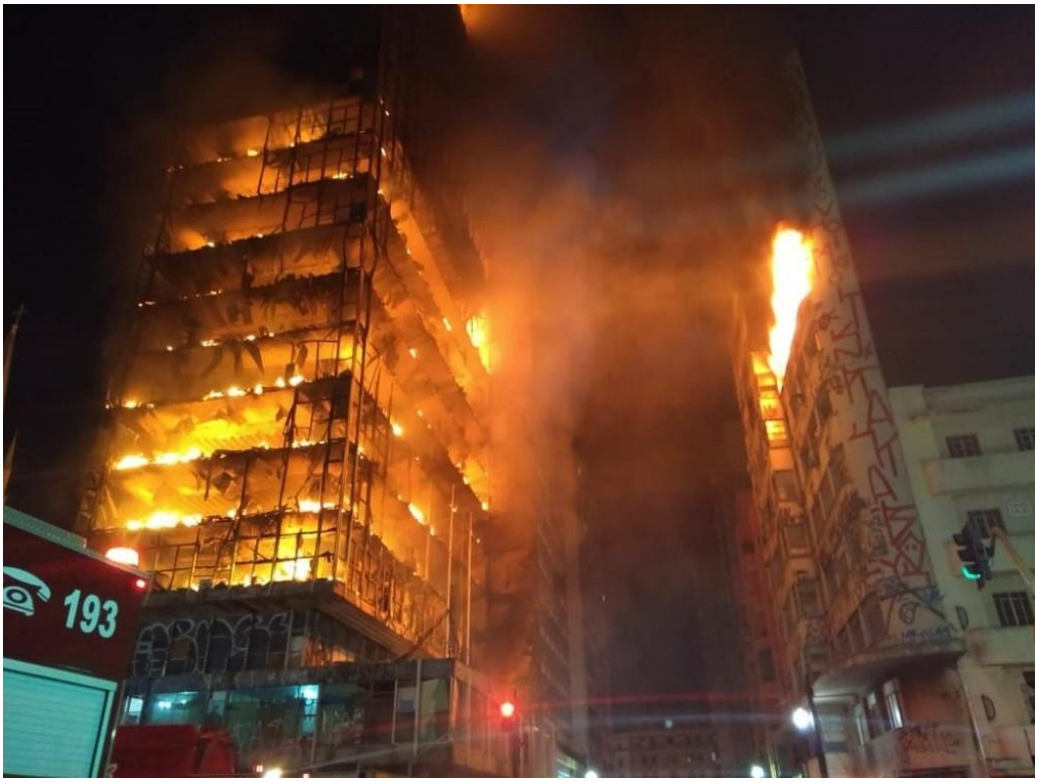


Photo: Fire Department

Also in 2018 there was the Interdiction of viaduct that repressed one of the main roads of São Paulo for more than four months.

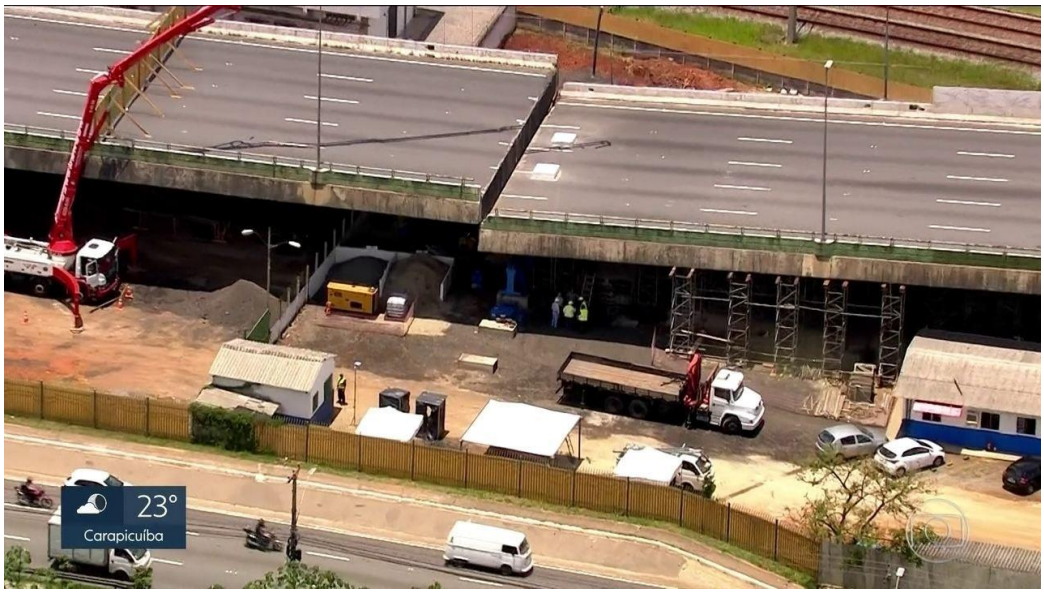


Photo: g1.globo.com

However, it is not only in Brazil that accidents of this magnitude occur. We can mention, for example, the 24 floors building in London in 2017 with 79 people dead and the fire in the mall in Siberia with 74 people dead in 2016.

Photo: Natalie Oxford / AFP Photo

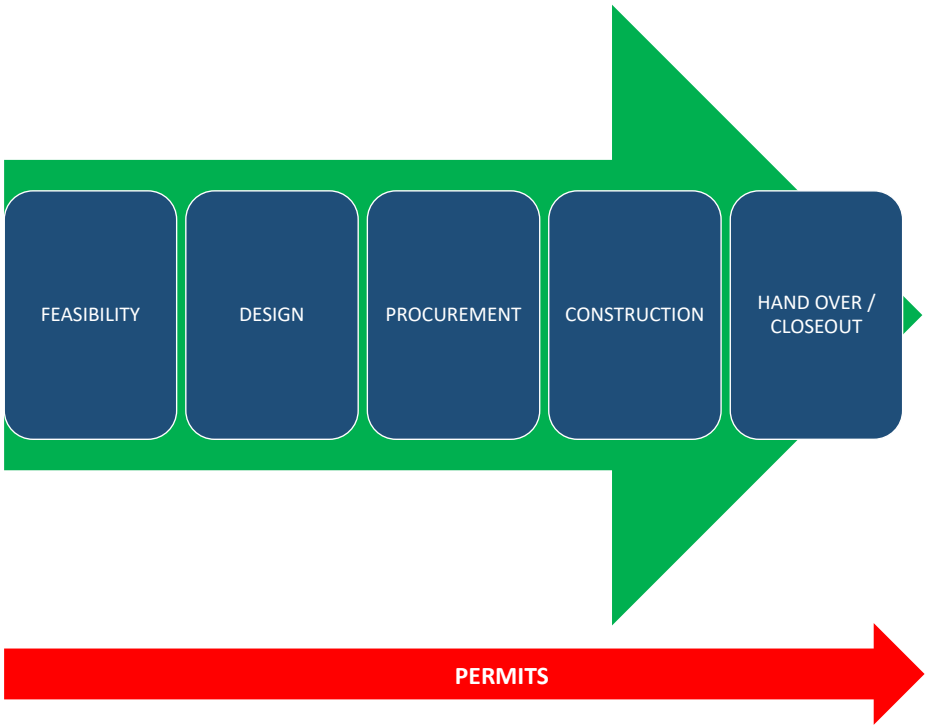
Photo: Ministry of Emergency Situations of Russia / AP

In the table below we present the possible initial causes or the factor that maximized of each disaster mentioned.

EVENT	POSSIBLE CAUSE OF DISASTER / FACTORS THAT POTENTIATE DISASTER
Breaking of the Brumadinho dam	Probable cause due to the type of structural design
Fire at Urubu's Nest Lodge	Fire-fighting design did not comply with fire regulations Edification did not have permits Non-execution of escape routes and use of flammable materials
Collapsing buildings in Muzema	Irregular construction
Breaking of the Mariana dam	Probable cause due to the type of structural design
Tim Maia cycle track collapses	Structural design did not predict the occurrence of giant waves in contact with the concrete structure
Fire in the Wilson Paes de Almeida building	Electrical installations in bad conditions Lack of fire-fighting equipment
Interdiction of viaduct	Lack of maintenance on the viaduct
Building fire in London	Use of flammable material on the facade of the building
Fire at shopping center in Siberia	Closed emergency exits

Many other similar events have occurred not only in Brazil but throughout the world. What we would like to address is that all of these disasters have a direct link with project management. Buildings and engineering works are projects.

Before, however, it is important to have the clarity of the phases in the engineering and construction projects life cycle. In a simple way the phases of the life cycle are:



Feasibility – is the phase of technical and economic feasibility of the project. It is the stage at which one decides whether the project go or non go.

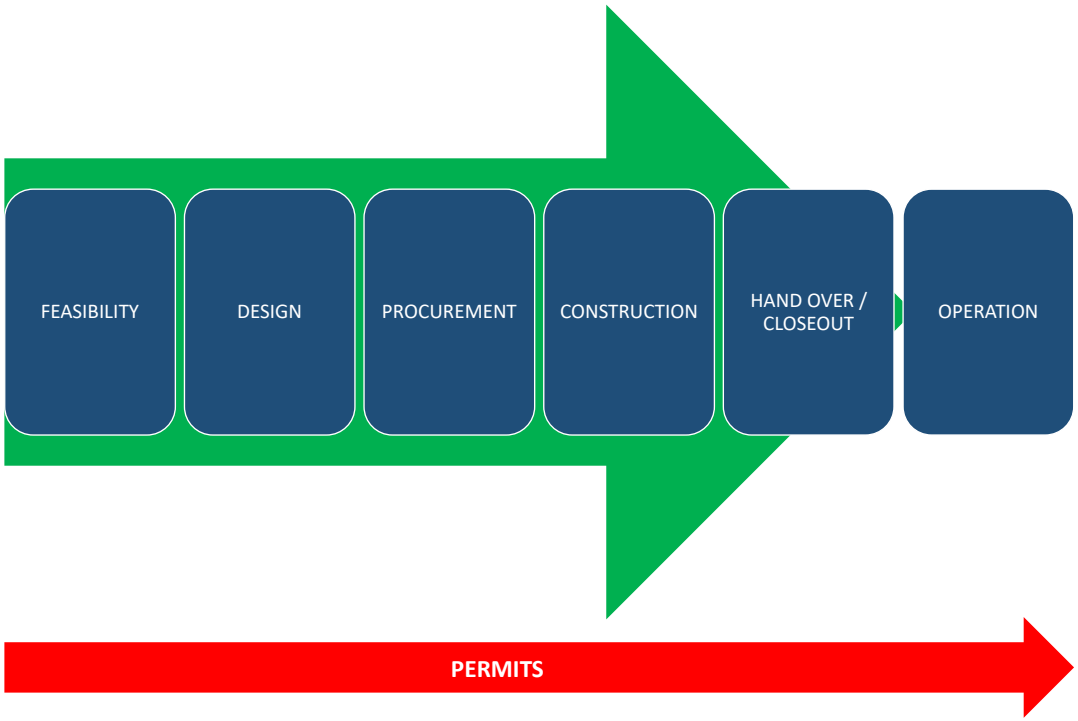
Design – is the development phase of executive engineering design.

Procurement – is the phase where all the necessary contractions are carried out to the project.

Construction – is the phase where the design is actually built.

Hand over / closeout – is the phase of the project closure and transfer to the operation.

A final phase was also included, which is specifically a phase of the product life cycle. This is the operation and use of the building.



Although many publications and authors indicate that permits are a phase of the project, we understand that permits is a series of activities that accompany and occur in all phases of the project,

The presentation of this conceptual introduction in a simplistic way about the phases of the project life cycle is to show that there is a relation with the disasters occurrences.

In these cases, the disasters occurrence happened already in the use of the project product, however, its initial causes occur largely at some point in the project life cycle, as shown in the table below.

EVENT	POSSIBLE CAUSE OF DISASTER / FACTORS THAT POTENTIATE DISASTER	PHASE IN WHICH THE INITIAL CAUSE IS GENERATED
Breaking of the Brumadinho dam	Probable cause due to the type of structural design	Design
Fire at Urubu's Nest Lodge	Fire-fighting design did not comply with fire regulations Edification did not have permits Non-execution of escape routes and use of flammable materials	Design Construction Operation
Collapsing buildings in Muzema	Irregular construction	Feasibility Design Procurement Construction
Breaking of the Mariana dam	Probable cause due to the type of structural design	Design
Tim Maia cycle track collapses	Structural design did not predict the occurrence of giant waves in contact with the concrete structure	Design
Fire in the Wilson Paes de Almeida building	Electrical installations in bad conditions Lack of fire-fighting equipment	Operation
Interdiction of viaduct	Lack of maintenance on the viaduct	Operation
Building fire in London	Use of flammable material on the facade of the building	Procurement
Fire at shopping center in Siberia	Closed emergency exits	Operation

This leads us to analyze an important area of knowledge, which is the risk management in projects. Project risk management discusses the risks related to project execution, i.e. during its life cycle. Looking at an extended life cycle that would include the use of the product, the analysis would be more complete.

The risk register would approach the performance of the project and, for example, when determining budget assumptions, defining the material specifications to be used or choosing constructive solutions, there would be through the probability versus impact matrix a more detailed analysis assertive.

Risk management should be placed on the task agenda of those responsible from the feasibility phase to the implementation phase. As an example, we can analyze the collapse of the Tim Maia cycle track. If there was a specific risk analysis on the impacts that could occur during the use operation phase, based on the assumptions adopted, the disaster would be avoided.

As noted in many other cases, the impact of the risk is generated and occurs in the use phase of the product. Therefore, it would also be important for risk management to include recommendations for product maintenance and use. This recommendation already happens with the availability of the owner operation manual, delivered by the construction company to the client and users.

The problem discussed here is recurrent and requires increased attention and that is why the vision addressed here should at least be analyzed.

About the Author

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Maurício Lopes, PMP is a Project Management Specialist. He is a PMP certified in 2000. He is a civil engineer with MBA in Project Management. He was one of the founders of the São Paulo PMI Chapter and Financial Director, Administrative Director, member of the Steering Committee from 1998 to 2003. He was vice-coordinator of the Project Management Division of the Engineering Institute of São Paulo from 1998 to 1999. Since 2004 Maurício Lopes has been speaking in project management courses for CPLAN, FATEC, INPG, IETEC and FIA. He has 20 years of experience in project management with main focus in the engineering & construction area.

Currently, Mauricio is associate director of M2L Project Management (www.M2L.com.br), a company specialized in project management consulting and implementation and operating in over 40 large engineering & construction projects. Maurício Lopes is author of articles for Revista Grandes Construções, a magazine specialized in engineering & construction, and he has the main characteristics related to project management - lean, practical and systematic ways.

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