Using Parliamentary Brazilian Open Data to Improve Transparency and Public Participation in Brazil

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ABSTRACT
Government concerns about transparency date from 1957, but current technological advances and real-time worldwide communications hold great promise to transform accountability, transparency, citizen participation and collaboration, in addition to offering better public services, by increasing efficiency and effectiveness and decreasing corruption in government. With these goals in mind, this paper describes *Meu Congresso Nacional* (My National Congress), a first prize winner application developed during the First Brazilian Parliament Hackathon focused on parliamentarians transparency by obtaining and analyzing data from several sources and displaying them on a user-friendly website. In addition, based on this development experience, this paper discusses the difficulties and challenges of developing applications based on Brazilian government data.

Categories and Subject Descriptors
J.1 [Computer Applications]: Administrative Data Processing – *Government.*

General Terms
Measurement, Documentation, Experimentation, Human Factors.

Keywords
Open Data, Open Government, E-Government, Transparency, Digital Society.

1. INTRODUCTION
Since the 50s, governments have been concerned about transparency and "*the right to know*" [1-3]. Since those years, governments agree that freeing government information has the potential to increase accountability, citizen participation and collaboration, while offering better public services, increasing efficiency and effectiveness, and decreasing corruption[4-8].

dg.o '14, June 18 - 21 2014, Aguascalientes, Mexico

978-1-4503-2901-9/14/06 $15.00.
http://dx.doi.org/10.1145/2612733.2612769

In the current information era based on real-time worldwide communication, we face a key moment in world data creation, sharing, and consumption [9]. Web technologies hold great promise with their ability to provide a new fast, interactive, and accessible context for government transparency by increasing government capabilities to publish data, and citizen capabilities to consume it.

Governments are only beginning to launch open data initiatives based on new web technologies. The Open Government Partnership (OGP) was launched in 2011, when the eight founding governments (Brazil, Indonesia, Mexico, Norway, the Philippines, South Africa, the United Kingdom, and the United States) endorsed the Open Government Declaration and announced their countries' action plans. In the past two years, the OGP has welcomed 55 additional governments into the Partnership.

To achieve the goals stated at the beginning of the OGP, governments launched open data portals to publish data. The U.S. launched www.data.gov, containing 88,372 datasets on February 2014, the United Kingdom government launched data.gov.uk with 13,274 datasets at same date. Other initiatives have been more modest: Brazil's dados.gov.br contains 187 datasets. In addition, the governments are also launching websites to present human readable data.

Regardless of these approaches have problems ranging from cultural to technological [10-13], some initiatives show it is possible to take advantage of e-government and open data to reduce corruption [4-6, 14].

To take advantage of this new scenario using new technologies to increase transparency, accountability and citizen participation in Brazil, this paper describes the *Meu Congresso Nacional*[1] (My National Congress) initiative, an application developed during the First Brazilian Parliament Hackathon focused on parliamentarians transparency by obtaining, analyzing and displaying data from several sources on a user-friendly website. Then, based on the experience of develop this application on Chamber of Deputies environment, this paper also discusses the challenges and difficulties of developing applications based on Brazilian government open data.

The remainder of this paper is organized as follows: Section 2 briefly presents the Brazilian current open data scenario and the Parliament Hackathon; Section 3 presents the application including its functionalities and architecture. Section 4 presents a

[1] http://www.meucongressonacional.com

discussion about the difficulties and challenges of developing applications using Brazilian open data, and Section 5 presents concluding remarks.

2. BRAZILIAN TRANSPARENCY AND OPEN DATA

Brazil is one of the founding governments of the Open Government Partnership, launched in 2011. The partnership declares *the ultimate goal of improving the quality of governance, as well as the quality of services that citizens receive*[2], and their commitment to (i) increase the availability of information about governmental activities; (ii) support civic participation; (iii) implement the highest standards of professional integrity throughout its administration; and (iv) increase access to new technologies for openness and accountability.

In its first Action Plan for OGP, Brazil undertook 32 commitments which were partially implemented but produced many important benefits, such as the creation of the Open Data Portal, the organization of a nationwide conference on transparency (CONSOCIAL) and the implementation of the Brazilian Access to Information Law. For its second plan, Brazil used a broader participation process, developed a bolder action plan, with 52 commitments — 19 of those proposed by Civil Society Organizations (CSOs) — and the involvement of 17 government bodies.

In January, 2014, the Brazil Open Data Portal (dados.org.br) listed 187 datasets and 3148 resources. It is useful to allow the development of applications using the data, but some problems have been found. First, there is not a common pattern or standard to publish data. Some resources are structured as machine-readable files like CSV and XLS spreadsheets, XML files or Web services; some are only human-readable or use closed formats, like PDF and DOC files. In addition, many isolated initiatives overlap national initiatives. For example, the Chamber of Deputies (*Câmara dos Deputados*) has its own open data portal, such as the Federal Senate, and neither is integrated with the official Open Data Portal.

In this context, it is very hard to build applications that use Brazil's government data, and more important, to incentive people, organizations, or companies to build software, applications, and services that use that data to achieve the benefits of transparency and open data. Trying to promote the use of this data, some hacker marathons and application contests are being financed by federal or municipal governments, such as the *National Parliament Hackathon*[3], *RioApps* contest[4] in Rio de Janeiro and *Cidadão Inteligente*[5] contest in Recife.

The application presented on this paper was developed during the National Parliament Hackathon, briefly described next subsection.

2.1 The Parliament Hackathon

In October 2013, the Brazilian Chamber of Deputies (*Câmara dos Deputados*) promoted the First Brazilian Parliament Hackathon, a Hacker Marathon. The main objective of the event was to create a collaborative channel between the Brazilian Parliament and the society through the education of software developers about the legislative process and the incentive for the development of solutions using Parliament's open data.

The Hackathon had two phases: First, it was a public call for conceptual projects from teams of one to three people aiming to increase transparency and citizen participation using Parliament's open data. Then, 99 projects were submitted and 27 were selected to be implemented in the second phase. In this phase, developers of selected projects (in total, 45 people) stayed for four days from 29 October until 01 November, 2013 with Chamber of Deputies talking with parliamentarians and technical staff, discussing and sharing with each other to acquire knowledge, get suggestions, and validate their ideas and applications. At the end, developers presented their projects and had one more week to refine them to compete for three prizes of almost US$2,200 (R$5,000). Event organizers explained that prize was the same regardless of 1st, 2nd or 3rd position because the main objective was cooperation and not strictly competition.

After committee evaluations, *Meu Congresso Nacional* received first prize. The second prize was given to *Monitora, Brazil*[6], a similar mobile application enabling searching and monitoring what deputies are doing, including attendance, proposed projects, rankings, Twitter and other information. Third prize was given to *Deliberatório*[7], an offline card game that simulates the process of law creation, using up-to-date data from Parliament. The complete list of projects can be found on the initiative's website.

3. THE APPLICATION

Meu Congresso Nacional is hosted at meucongressonacional.com since November 2013. The site is in Portuguese, but a Google plug-in allows easy translation to almost any language, with some minor mistakes. Its design is responsive, which means that it can be perfectly visualized on computers and mobile devices, as shown in Figure 1.

Figure 1. Application main page in a mobile visualization

[2] http://www.opengovpartnership.org/about/mission-and-goals (Retrieved: 02/15/2014)

[3] www.camara.leg.br/hackathon (Retrieved: 02/15/2014)

[4] http://rioapps.com.br (Retrieved: 02/15/2014)

[5] http://cidadaointeligente.rec.br (Retrieved: 02/15/2014)

[6] https://play.google.com/store/apps/details?id=com.gamfig.monitorabrasil (Retrieved: 02/15/2014)

[7] http://deliberatorio.com.br/ (Retrieved: 02/15/2014)

3.1 The Application

The application focuses on the transparency of all Brazilian Federal Parliamentarians, mainly the 513 Federal Deputies, but also the Republic's 81 senators. It shows all laws and amendments to the constitution (very common in Brazil) proposed by deputies, all commissions in which they participate or have participated, and detailed data about parliamentary quotas. These quotas are expenses paid by the federal government to support parliamentary activity, such as travel expenses, fuel and transportation in general, advertising, food, telephone and postal services, and are constantly suspected of being opportunities for embezzlement. The value varies according to deputy state but it is $15,000 (R$35,000) monthly, on average.

The main menu, shown in Figure 1, is composed of the following options: Home; Federal Deputies, which lists all 513 deputies; Senators, which lists the 81 senators of the Republic; Companies, which lists companies that had already received payments from parliamentarians and the amount received; some general statistics; and About, which shows additional information such as data origin. In addition, there is an option for the user to choose his/her preferred language. All pages also allow search for parliamentarians by full name or a part of his/her name.

The application shows detailed information about parliamentary expenses. It calculates the average expenditure per day, and rates each parliamentary member with respect to who has the greatest expense. So, it is easy to verify who in parliament is more or less economic, as shown in Figure 2, and to find who spends more, as is shown in Figure 3.

513 deputies found

Cabinet	Party	UF	R$ / day	Expenditures
Camarinha ABELARDO	PSB	SP	921.98	
ABELARDO Lupión	DEM	PR	795.48	
ACELINO Popo	PRB	BA	894.21	
ADEMIR CAMILO	PROS	MG	704.88	
ADRIAN	PMDB	RJ	450.70	
AELTON FREITAS	PR	MG	782.51	
Afonso FLORENCE	PT	BA	882.34	

Figure 2. List of Parliamentarians

Each parliamentarian has an individual page. There, an user can check name, nickname, party, total expenditures and average expenditure per day compared with others, as described above. These data are shown in Figure 4.

In addition, the same page shows all commissions that he/she participates or had participated in (Figure 5), such as the Education Commission or Environment and Sustainable Development. Moreover, the page also presents all laws and constitutional amendments he/she has presented, as is shown in Figure 6. Considering that Brazil is a representative democracy with direct voting, and citizens elect politicians directly to represent their interests, i.e., to propose and vote laws aligned with their electors' interests, presenting this data is important to people who want to verify whether his/her representative is really proposing what is expected and was advertised in the election campaign.

Members who have spent MORE

Cabinet	Party	UF	R$ / day	Expenditures
LIRA MAIA	DEM	PA	1,574.99	
CAESAR Halum	PRB	TO	1,374.32	
ALMEIDA LIMA	PMDB	SE	1,365.84	
GREEN CLEBER	PRB	MA	1,249.93	
RAUL LIMA	PP	RR	1,183.47	

Figure 3. List of Most Expensive Parliamentarians

The site also shows detailed data about representatives' public expenses. It shows data grouped by type, such as travel expenses, fuel, consulting, advertising, food, telephone and postal services, as shown in Figure 7.

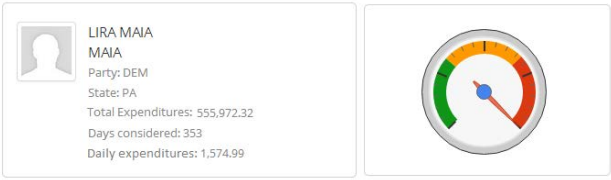

Figure 4. Parliamentarian general data

This area shows citizens each politician's priorities: to travel, to advertise, to rent cars, and so on. It is also important for inquiry. For example, why does one politician spend 78% of his quota just on advertising his activities? Why does another spend more than 50% of his quota renting cars?

Participates (or has participated) of 21 commissions

Acronym	Name
EC	Education Commission
Cindra	Committee on National Integration, Regional Development and Amazon
CPITRAES	Parliamentary Commission of Inquiry to investigate the exploitation of slave or forced to slave labor in rural and urban activities, Nationwide.
PEC49506	Special committee to render an opinion to the Proposed Constitutional Amendment No. 495-A, 2006, the Senate, which "adds item to the Temporary Constitutional Provisions Act, on the formation of new municipalities by the year 2000."
CMADS	Committee on Environment and Sustainable Development
PL187699	Special committee to render an opinion on the Draft Law No. 1876, 1999, Mr. Sérgio Carvalho, which "provides for Permanent Preservation Areas, Legal Reserve, forestry and other provisions" (repeal Law No. 4,771, of 1965 - Forest Code, amending Law No. 9605 of 1998)
CMO	Joint Committee on Plans, Public Budgets and Auditing
PEC11111	Special committee to consider and render advice to the Proposed Amendment to the Constitution No. 111-A, 2011, Mrs. Dalva Figueiredo, who "changes the art. 31st Constitutional Amendment No. 19 of June 4, 1998, and gives other measures ".

Figure 5. Example of the List of Commissions a Parliamentarian had Participated In

16 draft laws or amendment of the constitution since 2011

Acronym	Name	Menu	Date
PL	PL 6660/2013	Amends. 25 of Law No. 10,826, of December 22, 2003, to specify rules for the use of firearms, accessories and ammunition seized.	30/10/2013 16:55:23
PL	PL 4964/2013	Provides for general safety standards to prevent emergencies caused by fire halls, ballrooms and other similar environments to develop recreational activities.	02/06/2013 16:21:22
PL	PL 4965/2013	Amendment to Law No. 7,713, of December 22, 1988, and Law No. 8,212, of July 24, 1991, to exempt from income tax and social security contributions, the additional holiday referred to in art. 7, item XVII of the Constitution.	02/06/2013 16:22:12
PL	PL 5646/2013	Establishing tax incentives on the Tax on Industrialized Products (IPI), aimed at relief of machinery and equipment for the processing of solid waste.	23/05/2013 17:02:30
PL	PL 5034/2013	Includes Annex of Law No. 5,917, of September 10, 1973, which provides for the National Plan for Roads, the road stretch that specifies, in the State of Tocantins.	26/02/2013 16:39:33

Figure 6. List of draft laws or amendment of the constitution

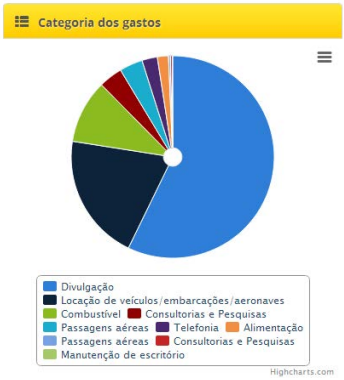

Figure 7. Expenses Distribution

It also shows expenses grouped by CNPJ (Brazilian company ID number), as is shown in Figure 8. The user can click on a CNPJ number and the site automatically gets company data from *Receita Federal* (the Brazilian Internal Revenue Service) and shows details about that company, such as company name and nickname, opening date, address, main activity, and legal status. In addition, it uses the Google Geolocation API to get the company's latitude/longitude and Google Maps to show the company's location on an expandable map. The same page consolidates and shows all payments from all politicians to that company. An example of this visualization is shown in Figure 9.

Spending of parliamentary quota in 2013

CNPJ / CPF	Type of expense	Description of Expenditure	Value
14091891000143	FUELS AND LUBRICANTS.	Motor Vehicles	29,945.73
33567231000130	FUELS AND LUBRICANTS.	Motor Vehicles	17,133.84
02551867000160	FUELS AND LUBRICANTS.	Motor Vehicles	338.00
08202116000115	FUELS AND LUBRICANTS.	Motor Vehicles	100.00
00306597005328	FUELS AND LUBRICANTS.	Motor Vehicles	100.00
13138707000100	DISCLOSURE OF PARLIAMENTARY ACTIVITY.	ALJ MARKETING LTD	15,000.00
13182427000108	DISCLOSURE OF PARLIAMENTARY ACTIVITY.	ATOS TWO VISUAL COMMUNICATION GRAPHICS PRINTED	99,400.00

Figure 8. Expenses Grouped by Company

This data is very important to accountability and to decrease corruption. First of all, it is possible to see the amount of money expended by each parliamentarian with each company, or with each kind of expense. For example, it is possible to verify some parliamentarian spending more than a full fuel gas tank per day. Or someone who spend on three months car rentals the value of a new car. On the other hand, it is possible to check that some companies that receives huge amount of payments opened to business on the same year that the parliamentarian was elected. Moreover, it is possible to easily check on the map the facade of companies, which in some cases are "*ghost*" companies and does not actually exists on that address. These verifications can be made both by citizens as well as by competent authorities.

Business

CLOUD TECHNOLOGY
OF FATIMA SANTOS FERREIRA - ME
17.589.509/0001-14
Opening Date: 08/02/2013
Main Activity:??? 62.09-1-00 - Support T cynical, maintaining it and the other services? in the technology informs the broiled?
Legal Nature: 213-5 - EMPRESARIO (INDIVIDUAL)
Address: Q QNM T SET LOT 36, 39,
72145-620, Brasília, DF
Status: ACTIVE, obtained on 08/02/2013
Total received from parliamentarians (in 2013): 263,840.00
obtained Given the IRS on: 6/1/2014

Location (experimental)

Received funds of 5 Member (s) in 2013

Deputy	State	Party	Value
CAESAR Halum	TO	PRB	153,000.00
Andre Moura	SE	PSC	54,640.00
SEBASTIAN BULLET ROCK	AP	SDD	32,500.00
RAUL LIMA	RR	PP	23,500.00
FABIO REIS	SE	PMDB	200.00

Figure 9. Company Details Page

The application has a menu option to list companies that received payments from parliamentarians, arranged by the amount of payments. By clicking on one company, the same page will provide company details, location, and consolidated payments. This option allows users to easily verify and check companies that receive significant contributions from parliamentarians.

3.2 Application Architecture

The application is composed by three basic components: the extractor; the analyzer; and the presenter, as is shown in Figure 10.

3.2.1 *Extractor*

Since Brazilian government data is spread across various repositories and in general does not adopt common standards or patterns, even on the same repository, the extractor is the most important component of this application's architecture. It retrieves all data needed by the application.

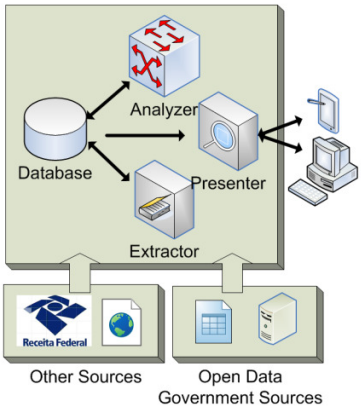

Figure 10. Application High Level Architecture

Data about deputies has been gotten from the Chamber of Deputies Open Data Portal:

- General data such as a list with his/her names and ID, gender, party, state, phone, and e-mail is gotten with a web service access;
- More detailed data as profession, birthday, and commissions are from another web service;
- Proposed laws and amendments to the constitution are from another web service;
- Expenses data are obtained by downloading XML files. The government publishes one file related to current year (updated almost every day), one file from last year (15MB zipped and 288MB unzipped), and one file from all past years (42MB zipped and 765MB unzipped);

Senator data is from a senate open data portal:

- General data in the same form as Deputy data from an specific web service;
- Expense data are obtained by downloading .CSV spreadsheets. The portal publishes one spreadsheet file (between 3 and 7 MB unzipped) for each year, beginning in 2009.
- Senator commissions and proposed laws and amendments to constitution are not implemented yet.

Companies detail data are obtained from *Receita Federal* (Brazilian Internal Revenue Service) website. It is important to notice that the *Receita Federal* does not publish this as open data. There is a website that allows people to check company data, and the site is protected by a CAPTCHA. Thus, to get company data, the application simulates a facade to the Receita Federal site, allowing the user to see and insert their CAPTCHA, and application to get the response and store data on its database. In addition, after get company data from Receita Federal, application sends company address to Google Geolocation service [15] to get and store company latitude/longitude, and is enabled to show it on a map. All this process is shown in Figure 11.

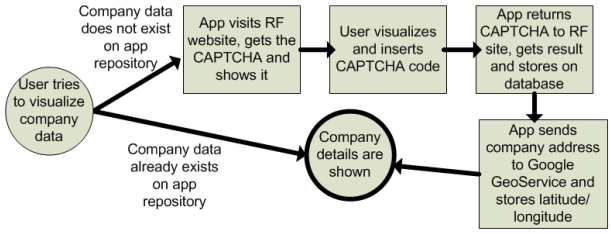

Figure 11. Process to get Detailed Company Data and Location

This component also has an auto-updater module responsible for updating expense data once a month.

3.2.2 *Analyzer*

This component is responsible to analyze raw data gathered by the extractor and generates useful information from that. This component generates parliamentary and company aggregations and totals, as well as parliamentary expense indices. Moreover, this component generates some general statistics, like expenses by party and global distribution of expenses about all parliamentarians.

3.2.3 *Presenter*

This component is responsible for generating pages and presenting information to users. The component was developed using JAVA technology combined with *Play! framework [16]*. This combination allows the application to receive and process requests and to dynamically generate responsive pages using a Tweeter Bootstrap[17] template and a few lines of JavaScript code. In addition, several graph libraries were tested and three of them were chosen to draw graphs: HighChart [18], Rickshaw [19] and Google Charts[20] libraries. All of them are open source, completely free or free for non-commercial use.

The Extractor and Analyzer components were also developed with JAVA technology.

Next, we present some discussion about the Hacker Marathon and the impact of application.

4. DIFFICULTIES AND CHALLENGES

Assessing effects of this kind of initiative is a challenging endeavor[21]. In this section, we discuss major challenges faced on application development and potential opportunities.

The authors agree with Robinson et. al. [22], who argued that "*it is preferable for government to understand providing reusable data, rather than providing Web sites, as the core of its online publishing responsibility*". Brazilian parliament has already websites that shows parliamentarian data. But these sites present problems, mainly: (i) it is very difficult to locate useful information on the websites; (ii) information is presented in a fine grained way. For example, it is possible to know how much one deputy spent in a specific month on each spend category, but it is almost impossible to get totals and aggregations.

Brazilian government publishes data in a multiple and decentralized way. Although a national open data portal exists (dados.gov.br), Chamber of Deputies and Senate publish their data on their specific portals, not integrated with national initiative. Moreover, some data must be gathered from other sources, such as *Receita Federal*. Furthermore, there is a lack of

standards for data publishing and each publisher chooses what and how to publish. For example, same data about expenses is published as XML files from Chamber of Deputies and as CSV files from Senate. Finally, data updates are not guaranteed and developers face API changes without any disclosure, which suddenly breakes many applications.

On the other hand, application demonstrates a good user acceptation. It was not yet well advertised: authors are making some improvements and searching for partnerships before starting a massive campaign to launch the application as a support for Brazilian elections in October 2014. However, despite no advertising and a multi-language version launched only in January 20, during the first month the site received more than 12.000 visits and currently receives between 50 and 100 visits daily.

Site visitors have made many suggestions. The most common suggestion is to create a return channel: a way to allow citizens to comment on data on the site, such as politicians' expenses, to approve or disapprove politicians' law projects, to offer some denunciation about "ghost" companies, or to identify suspect data. In addition, the parliamentarians offered a list of suggestions and the main suggestion is to have the opportunity to explain their expenses. Thus, combination of these requests, to allow citizens and politicians to comment on the site, if implemented in an intuitive way, such as logging in through social networks, has the potential to create a new and possibly revolutionary channel for direct communication between people and their representatives.

From the experience with the Chamber of Deputies and with conversations with Parliament's technical staff, the authors are convinced that it is promising to add a new functionality to this application: to revive government open data by republishing them in an open API after the data is gathered and analyzed by the application.

To deploy these new functionalities and to improve application architecture, reuse, scalability, and extensibility, the application is being refactored according to the Social Machines model [23-25]. This refactoring aims to allow an easily plug-in of data from diverse sources and developed by diverse developers, such as state parliaments or city data to allow the creation of a broad and collaborative portal of public data created and fed by society.

Moreover, some authorities such as the Federal Ministry of Prosecution (MPF) demonstrated interest in the site during its early development, made suggestions, and proposed a partnership to request some data and functionalities to support investigations.

5. CONCLUDING REMARKS

This paper described Meu Congresso Nacional (My National Congress), the first-prize winner of the First Brazilian Parliament Hackathon. The application focuses on the transparency of all Brazilian Federal Parliamentarians, mainly the 513 Federal Deputies. It shows parliamentarians proposed laws and amendments to the constitution, all commissions they participate or had participated in, and detailed data about parliamentary quotas. The application allows increased accountability and surveillance of parliamentarian expenses by the population as well as by competent authorities. Moreover, it has the potential for promoting public participation and collaboration by allowing people to check if parliamentarians are really representing their interests.

Based on the experience acquired on the development of this initiative, this paper also discussed some challenges and difficulties, such as: (i) the difficulty of governments to provide useful websites based on their data; (ii) the multitude and decentralization of data sources; (iii) the lack of standards for data publish.

Furthermore, the future work based on the possibility for representatives and people to comment on the site could create a new, and maybe revolutionary channel of communication. In addition, the creation of an infrastructure to revive government data by republishing them in an open API after data is gathered and analyzed by the application has the possibility to create a broad and collaborative public data portal created by, and available to, all society.

6. ACKNOWLEDGMENTS

This work was partially supported by the National Institute of Science and Technology for Software Engineering (INES), funded by CNPq and FACEPE, grants 573964/2008-4, APQ-1037-1.03/08 and APQ-1044-1.03/10 and Brazilian Agency (CNPq processes number 475743/2007-5 and 140060/2008-1) and a CNPq scholarship.

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