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Why e-government projects fail? An analysis of the Healthcare.gov website

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ABSTRACT

Electronic government or e-government project failure has been widely discussed in the literature. Some of the common reasons cited for project failure are design-reality gaps, ineffective project management and unrealistic planning. Research shows that more than half of e-government projects result in total or partial failures with regard to the initially grounded standards, scheduling or budgeting plans, while even more fail to meet end users' expectations. This paper focuses on the factors that lead to e-government project failures. It explores the context of project failure and investigates the launch of the U.S. Healthcare.gov website. This case is concerned with a highly public e-government project failure where gaps between political agendas and planning are identified through an examination of media sources and social media data analysis of Twitter discussions. The finding of the analysis indicates that e-government users react against failures, while e-government projects will impact and attract opinion makers' attention that influence audience behavior. This research provides classifications of e-government project failure reasons and sources. Moreover, another contribution is the beginnings of a typology for social media activity against e-government project failures.

1. Introduction

Public administration's digitization and re-engineering was initially discussed during the decade of 1960s, while Internet-enabled e-government was introduced in the early 1990s (Andersen and Henriksen, 2006; Anthopoulos & Fitsilis, 2014; Garson, 2004; Layne & Lee, 2001; Scholl, 2003) both as a means for governments to utilize Information and Communications Technologies (ICT) in order to become more effective and efficient in delivering information and services to the public; more accountable and transparent regarding their internal processes, procurement and auctioning; more open with regard to citizen engagement in decision and policy making; and even more friendly and able to deliver customized and modern public services (Heeks & Bailur, 2007; Kim, Pan, & Pan, 2007; Tan, Pan, & Lim, 2005). Electronic government or e-government is being implemented through top level e-strategic planning, which results in corresponding program development and becomes feasible with project portfolio and project implementation (Anthopoulos & Fitsilis, 2014). E-government projects differ from other project categories (i.e., construction and ICT etc.), due to their complexity in terms of organizational size; corresponding resistance to change; novelty; end-users' impact and politics. Moreover, many e-government projects combine technical features from both the construction and the ICT industries, which increase innovation and uncertainty (Janssen, van der Voort, & van Veenstra, 2015; Janssen, Van Veenstra, & Van der Voort, 2013).

However, after all of these years, e-government outcomes are being questioned and various scholars debate about its potential. Failures, which vary from not establishing project success; to missing citizen expectations and adoption (Janssen et al., 2013); even to preferences in turning back to traditional channel selection (i.e., face-to-face visits and voice phone calls) are being illustrated in the literature (Heeks & Bailur, 2007; Reddick & Anthopoulos, 2014; Reddick & Turner, 2012), questioning both e-government feasibility and sustainability (Paulin, 2014, 2015).

On the other hand, governments try to reach solutions that can enhance e-government development and various proposals have been given so far, some of them worth mentioning and include (Anthopoulos & Fitsilis, 2014): management frameworks that emphasize e-government; legal framework adjustments that release e-government potential (i.e., digital signatures); strategic key driver definition (i.e., eID); political declarations that drive e-government vision (i.e., European Union Malmo Declaration on e-government and U.S. Paperless Action etc.); and international monitoring and measurement

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(i.e., by United Nations, the World Bank and the Organization for Economic Cooperation and Development (OECD)).

Results from international studies have illustrated some of the factors that impact e-government development and could be defined as barriers and drivers. For instance, digital literacy and Internet penetration are drivers for e-government success, while the digital divide and trust are some of the documented barriers (Anthopoulos & Fitsilis, 2014; Heeks & Bailur, 2007; Kim et al., 2007). Governments have, as a result, invested huge sums of money on strategies, programs and projects (Anthopoulos & Fitsilis, 2014) and try to eliminate these documented barriers.

E-government project failure is still more than a reality and range from partial failures to complete abandonments because of missing real business needs, and end-user satisfaction from adoption. For instance, Heeks (2001) showed in his study that 35% of public sector ICT projects from around the world can be categorized as failures, 50% as partial failures, and only 15% as successful. In New Zealand, 59% of public ICT projects were partial failures and 3% total failures (Goldfinch, 2007). Similarly, a World Bank study showed that the majority of public sector ICT applications in least developing countries were either partial or total failures (Neto, Kenny, Janakiram, & Watt, 2005). Hidding and Nicholas (2009) noted that 19% of ICT projects were abandoned without completion and 46% were completed and operational, but were over budget, late, and/or without meeting initially grounded standards.

This paper examines the problem of e-government project failures through examining project management failure literature and applies the concepts learned to a case study. In order to accomplish this, the authors aim to answer the following two research questions:

RQ1: What are the main reasons for e-government project failures?

Project failure reasons have been discussed broadly (Boehm, 2000; Kappelman, McKeeman, & Zhang, 2006; Pinto & Mantel, 1990; Yeo, 2002) and e-government project failures have been classified by various scholars and important factors have been identified (Almarabeh & AbuAli, 2010; Esteves & Joseph, 2008; Gauld, 2007; Gichoya, 2005; Heeks, 2001; Nielsen & Pedersen, 2014). In this paper, both a literature review and a representative large-scale public project failure are examined through the launch of the Healthcare.gov website by the federal government in the U.S. In order to analyze this failure, authors used evidence from official sources, mass media accounts, and government document analysis. This research method generated the second research question that this paper aims to answer:

RQ2: Can social media data analysis, such as Twitter, be used to determine the impact of e-government project failures on public opinion?

Various scholars have used social media data analysis (Vakali, Chatzakou, Koutsonikola, & Andreadis, 2013). As examples, twitter data analysis for opinion mining (Pak & Paroubek, 2010), microblogging analysis during crises (Terpstra, Stronkman, de Vries, & Paradies, 2012), and for examining various industrial applications such as for stock market behavior's prediction (Bollen, Mao, & Zeng, 2011). Social media data analysis for government purposes has not been fully explored, but various scholars discuss this subject from different lens. For instance, Waters and Williams (2011) illustrate such an analysis for communication patterns in the public sector; Bertot, Jaeger, and Grimes (2012), Bertot et al. (2010) and Bonsón, Torres, Royo, and Flores (2012) propose social media utilization for government transparency; while others introduce the terms government 2.0 (Chun, Shulman, Sandoval, & Hovy, 2010) or we-government (Linders, 2012) to define social media use for citizens' interaction with their governments. In this context, social media data analysis appears to be a challenging new research method (Ajith, Aboul-Ella, & Vaclav, 2010) and can serve various governmental purposes. This paper is different from existing studies, since it focuses on micro-blogging data analysis through Twitter. More specifically the authors analyze Twitter data to demonstrate how the Healthcare.gov e-government project failure influenced public opinion.

The remainder of this paper is structured as follows: Section 2 performs a literature review. Section 3 contains this paper's methods for answering the abovementioned research questions. Section 4 provides a discussion of the key findings. Finally, Section 5 contains conclusions and thoughts for future research.

2. Literature review

A project is the "vehicle" for strategic realization for both the private and the public sectors and it is defined as a temporary endeavor undertaken to create a unique product, service, or result (PMI, 2013). Project management is the science that addresses planning, organizing, directing, and controlling of organizational resources for relatively short-term objectives that has been established to complete specific goals and objectives (Kerzner, 2001). In addition project management is a method that will guide the project through a controlled, well managed, visible set of activities to achieve desired results (APM, 2012).

In this section, the authors perform a literature review on project failure and it investigates specifically why e-government projects fail. This review was conducted during May 2014 to September 2014, focusing on journals located in SCOPUS and ScienceDirect. Search was performed in the subject areas of computer science and business and management, with terms "project failure", "project success", "public project failure", "public project success", "e-government project failure" and "e-government project success", seeking articles published after 1990. More than 1000 articles were returned, which were screened in the context of this article on e-government project failure. This process left out many articles, which discuss construction and engineering projects, as well as government failures in general. The selected literature findings shown in this study emphasize e-government project failure, with only some articles discussing project failure in general were kept in the analysis. A total amount of more than 30 articles were studied in detail, as well as some citations contained in them – books, chapters and papers published in conference proceedings– that had direct relevance to the paper. These research studies were accompanied by the most widely accepted project management standards, which were studied in the context of project failure.

2.1. Project and e-government project failure

Project failure is a major issue for project management theory and various scholars have examined sources, factors, and treatment methods for the three main project categories: construction; research and development (R&D); and ICT. In order to define project failure, it is important for the project lifecycle to be realized (Fig. 1). A project starts with its conception; moves to its definition when owner's requirements are identified; shifts to contracting and planning processes where the project is procured, contracted and determined; the implementation phase follows, where construction and project management techniques develop the agreed mission; then testing and use phases concern the post-completion period where project deliverables are operating; while the project ends at the moment when the overall driving business objectives are no longer required (Ojiako, Johansen, & Greenwood, 2008). A project failure can, therefore, occur anytime during this period and not only during project implementation.

Failures concern (Guha & Chakrabarti, 2014; Pinto & Mantel, 1990) project abandonment during the implementation stage (total failure) or the achievement of some of the initially grounded project objectives (partial failure). These two failure categories can be called pre-completion or at-completion failures. However, projects that get implemented successfully, can fail during the test of time (sustainability failure) and space (replication failure). Moreover, other projects are

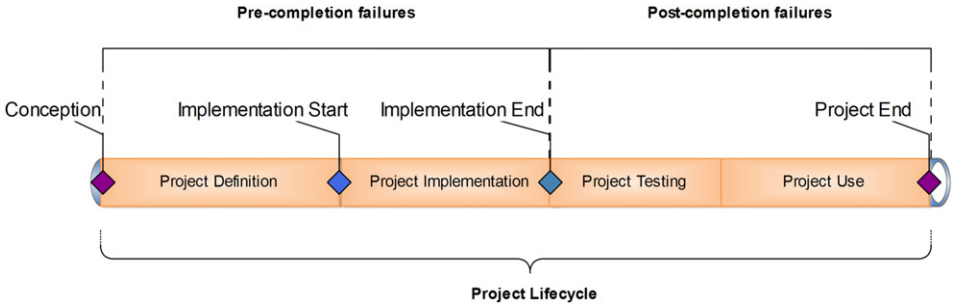

Fig. 1. Failure timeline during project lifecycle.

decided to be terminated after completion due to missing business-goals; to underestimated operation costs (mission failure); because they fail to make a profound impact on the lives of the people (objectives failure); the outcomes do not gain user satisfaction (satisfaction failures); or since project deliverables are not adopted by project stakeholders (adoption failures). All of these types of failures occur after project completion, but during project life-cycle and can be called post-completion failures.

Project success or failure avoidance is the "core business" of project management science. In this respect, all project management organizations (Project Management Institute (PMI), International Project Management Association (IPMA), Association of Project Management (APM), and Australian Institute of Project Management (AIPM)) develop and update standards and bodies of knowledge (PMBOK (PMI, 2013), ICB (IPMA, 2006), ApM BOK (APM, 2012), AIPM Competency Standards (Crawford, 2007)) in order to secure project success via controlling various project attributes (i.e., time, scope, quality, and cost).

However, despite the application of these standards and bodies of knowledge, projects still fail (Hidding & Nicholas, 2009; McKinsey & Company, 2012) and result in extensive money loss and market damages in terms of benefits shortfalls. Scholars have differentiated failure reasons from failure factors. This differentiation is not clear and can be explained from their observation that reasons can be concerned to be variants or events that appear mostly during project life-cycle in project organization. Factors are forces of failure, which exist before project conception or remain after project completion in the project ecosystem.

Top-failure reasons and factors in e-government project failures are presented in Tables 1 and 2. Ambiguous mission statement and poor project management (i.e., scope, scheduling, communications, stakeholders engagement, etc.) are top failure reasons (Fairley & Willshire, 2003; Imamoglou & Gozlu, 2008; Kappelman et al., 2006; Loukis & Charalabidis, 2011; Nelson, 2007; Ojiako et al., 2008; Phillips, Bothell, & Snead, 2002; Pinto & Mantel, 1990; Verner, Sampson, & Cerpa, 2008) and result in the abovementioned failures and associated consequences in an extent of resource overuse; unmet client needs; low employee morale; high employee turnover; and longer time to market. Research also shows that successful project management alone cannot prevent failures and project complexity (Ojiako et al., 2008; Verner et al., 2008), educational barriers and organizational limits, for instance, create project failures (Lyytinen & Robey, 1999; Nelson, 2007) as well.

Organizational power and politics are considered to be the most important factors for government ICT and e-government project failure (Janssen & Klievink, 2012; Janssen et al., 2013, 2015; Luk, 2009; Warne, 1997; Warne & Hart, 1996). Furthermore, design-reality gaps and ineffective project planning and management appear to damage e-government projects (Esteves & Joseph, 2008; Gauld, 2007; Goldfinch, 2007; Heeks, 2001; Heeks, 2003; Scholl, 2003).

Tables 1 and 2 comprise a failure taxonomy tool that can be utilized by project managers and political leaders for potential failure sources and factors discovery and avoidance in e-government projects. However, beyond the above findings, existing research shows that failure factors are associated to the lack of e-readiness (Guha & Chakrabarti, 2014; Heeks, 2001), while strong political commitment and effective traditional project management appear to be the obvious solutions against the above failure sources. Nevertheless, additional treatment methods are project implementation with focus on key-success factors, which are aligned with e-government challenges (Almarabeh & AbuAli, 2010; Gil-Garcia & Pardo, 2005); project alignment to public organization's business processes (Ebrahim and Irani, 2005); the application of failure estimation techniques (Gichoya, 2005); alternative project and project-portfolio management methods (Aikins, 2012; Guha & Chakrabarti, 2014; Kamal et al., 2011; Nielsen & Pedersen, 2014; Sarantis, Charalabidis, & Askounis, 2011; Tan et al., 2005), which emphasize project results management, design-reality gap-closing and stakeholders' engagement.

Previous analysis on project and e-government project failure sources return useful findings. Although projects are classified in three categories (construction, R&D and ICT), e-government projects appear to become another classification category, which requires particular treatment. The main reason is the extensive size and scope that most e-government projects have, in terms of time, context (they combine construction, innovation and ICT activities) and users' audience. Furthermore, complexity in terms of number of stakeholders, novelty and organization's structure is another factor. Finally, risks that arise from political sources and return broad design-reality gaps appear to be a failure source.

Another useful finding are the reasons and factors that lead to project and e-government project failures can either at the pre-completion or at post-completion stages (Tables 1 and 2). Research shows that design-reality gaps appear to be the most important pre-completion failure reason, while project content and execution issues follows. Moreover, business focus, external factors and user satisfaction appear to generate post-completion failures. On the other hand, although ineffective project management appears to be the most important failure factor, politics, organizational power and ICT-respective parameters can cause project failures anytime during project life-cycle. These findings show that most scholars consider strong project management necessary, but this alone is not enough to secure project success. Nevertheless, poor project management practices such as lack in creativity and visioning; poor communication and organization skills; unclear work-breakdown; ineffective workload management; accompanied by poor delegation and tracking result in project failures (Phillips et al., 2002).

3. Research methods

The above literature review provides answers to first research question (RQ1) about the main reasons for e-government project failures and is used as a failure taxonomy tool for e-government projects. The second research method (RQ2) that this paper uses is the analysis of a representative case study (Saunders, Lewis, & Thornhill, 2009). More specifically, the launch of the Healthcare.gov

Table 1
E-government project failure reasons.

Reason	Comments	Citations
Design–reality gaps	Concern hard-soft gaps (between technology and social context); private-public gaps (differences between the public and the private sector); and country context gaps (variances between counties).	Pinto and Mantel (1990), Heeks (2001, 2003), Dada (2006), Gil-Garcia and Pardo (2005), Ebrahim and Irani (2005), Almarabeh and AbuAli (2010), Sarantis et al. (2011), Goldfinch (2007), Gauld (2007), Nielsen and Pedersen (2014), Luk (2009), Guha and Chakrabarti (2014), Ojiako et al. (2008), Scholl (2003), Kamal, Weerakkody, and Irani (2011) and Tan et al. (2005)
Missing focus	Missing or ambiguous business focus and/or unclear objectives or absence of need.	Pinto and Mantel (1990), McKinsey and Company (2012), Sarantis et al. (2011), Imamoglou and Gozlu (2008), Kappelman et al. (2006), Scholl (2003), Kamal et al. (2011), Tan et al. (2005), Boehm (2000) and Nelson, (2007)
Content issues	Project scope definition, change management, shifting requirements and or/technical complexity.	Pinto and Mantel (1990), McKinsey and Company (2012), Gil-Garcia and Pardo (2005), Almarabeh and AbuAli (2010), Sarantis et al. (2011), Verner et al. (2008), Hidding and Nicholas (2009), Gauld (2007), Kappelman et al. (2006), Luk (2009), Ojiako et al. (2008), Scholl (2003), Kamal et al. (2011), Tan et al. (2005), Boehm (2000), Aikins (2012), Fairley and Willshire (2003) and Loukis and Charalabidis (2011)
Skill issues	Project unaligned team and/or lack of skills.	Pinto and Mantel (1990), McKinsey and Company (2012), Gil-Garcia and Pardo (2005), Ebrahim and Irani (2005), Gichoya (2005), Verner et al. (2008) and Luk (2009)
Execution issues	Unrealistic schedule and/or reactive planning; and misinformation with regard to massive and unaccounted cost overruns, benefit shortfalls, and waste.	Pinto and Mantel (1990), McKinsey and Company (2012), Verner et al. (2008), Imamoglou and Gozlu (2008), Hidding and Nicholas (2009), Gauld (2007), Kappelman et al. (2006), Luk (2009), Ojiako et al. (2008), Scholl (2003), Kamal et al. (2011), Tan et al. (2005), Boehm (2000), Pardo and Scholl (2002), Fairley and Willshire (2003) and Loukis and Charalabidis (2011)
Regulatory issues	Lack in or missing of corresponding legal framework, policy and standards. Unpredictability of changes in the regulatory framework, failure due to legal disputes, implications of legal certainty in the digital realm	Gil-Garcia and Pardo (2005), Luk (2009) and Paulin (2014, 2015).
External factors	Outside the project organization	Goldfinch (2007), Nielsen and Pedersen (2014), Luk (2009), Guha and Chakrabarti (2014) and Tan et al. (2005)
Missing user satisfaction	Projects do not succeed in meeting users' expectations and project products are not of public interest and use.	Pinto and Mantel (1990), Imamoglou and Gozlu (2008), Luk (2009), Tan et al. (2005) and Janssen et al., 2013, 2015

website or the Obamacare website, which demonstrates how an e-government project can fail during its implementation process. The analysis of this case study was based on the following process (Fig. 2):

1. initially a combination of official announcements and government reports were examined and a failure timeline was determined;
2. then news media articles were located through Google Internet searches during the above-determined timeline and they were analyzed. These media articles provided a failure timeline and outlined the triggered events; and
3. finally, the above findings returned failure reasons and factors, which were associated with previously discussed failure reasons and factors. This step tests the previously defined taxonomy tool.

The third research method provides a computational social network analysis of Twitter data discussions that took place during the identified

Table 2
E-government project failure factors.

Failure factor	Explanation	Citations
Organizational power	Organization structure and relations	Warne and Hart (1996), Warne (1997), Ebrahim and Irani, 2005; Gauld (2007), Nielsen and Pedersen (2014), Scholl (2003), Boehm (2000), Janssen and Klievink (2012) and Janssen et al., 2013, 2015
Politics	Government and top-level leaders' commitment, and appropriate political support.	Warne and Hart (1996), Warne (1997), Almarabeh and AbuAli (2010), Gauld (2007), Nielsen and Pedersen (2014), Tan et al. (2005), Lyytinen and Robey (1999), Verner et al. (2008) and Boehm (2000)
Education	Appropriate skills for project operation and acceptance, as well as execution of training activities.	Pinto and Mantel (1990), Lyytinen and Robey (1999), Gichoya (2005), Almarabeh and AbuAli (2010), Goldfinch (2007), Verner et al. (2008), Scholl (2003) and Boehm (2000).
Project management issues	Underestimate of timeline; weak definitions of requirements and scope; inefficient risk analysis and management; unsuccessful monitoring and measurement.	Pinto and Mantel (1990), Warne and Hart (1996), Warne (1997), Pardo and Scholl (2002), Yeo (2002), Gil-Garcia and Pardo (2005), Ebrahim and Irani (2005), Gichoya (2005), Almarabeh and AbuAli (2010), Sarantis et al. (2011), Goldfinch (2007), Verner et al. (2008), Hidding and Nicholas (2009), Gauld (2007), Nielsen and Pedersen (2014), Kappelman et al. (2006), Luk (2009), Ojiako et al. (2008), Scholl (2003), Kamal et al. (2011), Tan et al. (2005), Boehm (2000) and Aikins (2012)
Ambiguous business needs and unclear vision	Project's objectives are not clear or justified for their necessity.	Pinto and Mantel (1990), Warne and Hart (1996), Warne (1997), Yeo (2002), Gil-Garcia and Pardo (2005), Sarantis et al. (2011), Kappelman et al. (2006), Guha and Chakrabarti (2014), Scholl (2003), Kamal et al. (2011), Boehm (2000) and Nelson (2007)
Security and privacy	Project products do not secure transactions and sensitive information.	Ebrahim and Irani (2005), Almarabeh and AbuAli (2010) and Scholl (2003)
Finance and operational costs	Deliverables' operation and maintenance costs were underestimated and not secured.	Ebrahim and Irani (2005), Gichoya (2005), Almarabeh and AbuAli (2010) and Guha and Chakrabarti (2014)
ICT and system development process	Problems with regard to infrastructure, data, compatibility, information management	Pinto and Mantel (1990), Warne and Hart (1996), Warne (1997), Ebrahim and Irani, 2005; Gichoya (2005), Almarabeh and AbuAli (2010), Sarantis et al. (2011), Goldfinch (2007), Hidding and Nicholas (2009), Luk (2009), Guha and Chakrabarti (2014), Scholl (2003), Kamal et al. (2011), Tan et al. (2005), Nelson (2007), Janssen and Klievink (2012) and Janssen et al., 2013, 2015

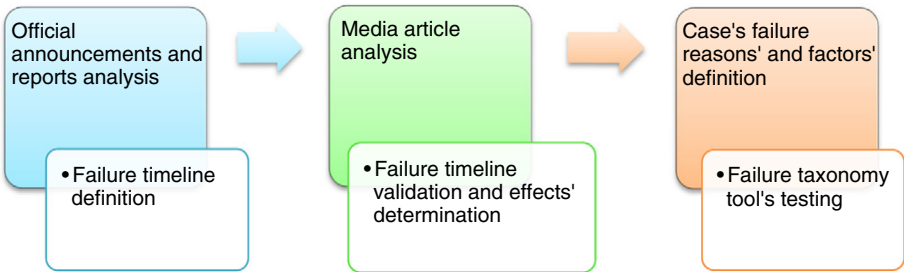

Fig. 2. Case study's analysis process.

timeline from the above second research method. This analysis was performed from the website's launch on October 1st 2013 and lasted two months until early December 2013, when major glitches and failures on this website stopped.

Computational social network analysis is a recent research method (Ajith et al., 2010), which has been utilized for opinion mining (Pak & Paroubek, 2010); for crisis management (Terpstra et al., 2012); or for stock market behavior's prediction (Bollen et al., 2011). For the purposes of this paper, Twitter was preferred against other social media platforms since its content is shorter and depicts better the size of audience reaction, in terms of:

- Hashtags, which simplify relating dialogues with the case study;
- Impact, which is expressed with the number of followers that retweeted opinions; and
- Opinion makers, which attract the most retweets on their grounded positions.

The analysis of Twitter data was based on the following process (Fig. 3):

1. Twitter data mining regarding the selected case study and during the specified timeline;
2. Results analysis and visualization regarding:
   a. Peak discussion days (top events)
   b. Top influencers
3. Matching the results of the analysis to the failure timeline of the case study and to the failure taxonomy tool; and
4. Typology of social media utilization for project failure management definition.

Twitter mining was performed with HTCondor software (http://research.cs.wisc.edu/htcondor/manual/index.html). Using this software, keywords were used to discover discussions that had taken place in the examined two month period associated with the Healthcare.gov website.

3.1. The Healthcare.gov case study

This case study of the rollout of the Healthcare.gov website, or more commonly referred to “Obamacare” website is investigated in this study. The focus is on determining whether the failure taxonomy tool applies to this case. The outcomes of this case study depict its failure type, reasons, and factors. However, planning failures are also illustrated from this case (Armour, 2014).

Healthcare.gov is a health insurance exchange website which is operated by the U.S. federal government and was originally designed to serve residents of 36 states –while today it serves 44 states– that opted not to create their own state health insurance exchanges (GAO, 2013). For the development of the website, the Department of Health and Human Services (HHS), is a cabinet-level department of the federal government, was ultimately responsible for the Healthcare.gov website and its end-to-end performance and integration. According to Eichenwald (2013), the Healthcare.gov website was one of the most complicated web-based undertakings ever envisioned by the federal government. Healthcare.gov is essentially a clearinghouse to allow Americans that need a health insurance plan to comparison shop on prices of plans in their states, to begin enrollment in a plan, and to find out if they qualify for government healthcare subsidies.

Despite the strong political will and extensive spending, Healthcare.gov crashed during its launch on October 1st, 2013 and remained inactive for several weeks. The website failed to meet initially grounded requirements for providing its services and various glitches were reported for a period of time. The development of the Healthcare.gov website involved 55 different contractors, all-operating under the supervision of the Centers for Medicare and Medicaid Services (CMS), an agency within HHS. Project definition issues were shown following events that underestimated various requirements, such as to define a redundant ICT architecture, not being able to handle a massive number of individual users which attempted to register simultaneously immediately after project launch. There were 9.47 million users that attempted to register during the first week of the launch, and only 271,000 succeeded (Cleland-Huang, 2014).

Table 3 illustrates project management problems/inefficiencies taken from PMBOK knowledge areas (PMI, 2013). PMBOK was selected as an indicative, but broadly accepted project management standard to demonstrate Healthcare.gov website development. More specifically, PMBOK provides project managers with guides for successful control of the following project knowledge areas: a) scope; b) integration; c) time; d) cost; e) quality; f) risk; g) human resource; h) procurement; i) communications; and j) stakeholders. These guides are standardized and aim to secure project success.

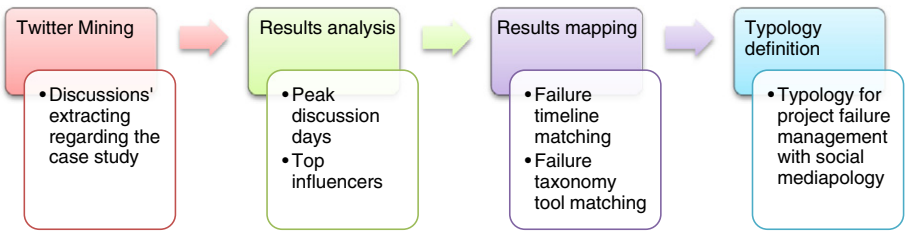

Fig. 3. Social media analysis process.

The remainder of this sub-section illustrates key events surrounding the launch of the Healthcare.gov website. The sources used come from government reports and media accounts. As much as possible the original journalistic style is kept in to show the tone of the discussion more accurately. According to the findings, there were plenty of missed opportunities to fix the website before its October 1st, 2013 launch.

Senior Obama administration officials were warned in late March 2013 by outside management consultants McKinsey & Company of early troubles with the website. This report was commissioned at the request of HHS (LaFraniere & Lipton, 2013). The report indicated that efforts to build the Healthcare.gov website was falling behind and at a risk of failure, unless immediate steps were taken to correct the problems. In addition, an internal report prepared for the CMS, and delivered at the end of March 2013, six months before the launch, identified six tests that the developing Healthcare.gov website did not meet (Allen, 2013):

1. its needs were evolving, rather than clearly articulated;
2. there was no clear definition of success;
3. the program relied too heavily on contractors and other outside parties;
4. the design, build and test phases were stacked on top of each other rather than sequential;
5. there wasn't enough time allotted for end-to-end testing of the system; and
6. the site was expected to launch at full volume rather than phasing in over time.

The Government Accountability Office (GAO), (an independent agency which provides to the United States Congress audit, evaluation, and investigative services) further reported in June 2013 that there could be trouble with the goal of opening the website by October 1st 2013, given the amount of work that still needed to be done on the website (GAO, 2013). The internal architecture shows that the Healthcare.gov website is indeed very complex (Gillum & Pace, 2013). Insurance applicants must have a host of personal information verified such as their income and immigration status. The system connects to federal government computer networks in departments and agencies such as the Social Security Administration, the Internal Revenue Service, Veterans Administration, Office of Personnel Management, and the Peace Corps.

Table 3
Healthcare.gov project context, according to PMBOK knowledge areas.

Knowledge Area	Findings
Integration management	The program relied too heavily on contractors and other outside parties; Project Organization was complex.
Scope management	Complex architecture design; evolving requirements
Time management	Timeframe: March 2010–December 2013. The design, build and test phases were not sequential.
Cost management	No particular budget and cost planning control for the $630 million spending.
Quality management	Unrealistic requirements engineering was performed.
Human resource management	Ambiguous due to the vendors' number and contractor schema's complexity.
Communications management	Complex due to the size of stakeholders. A mistaken plan was followed according to case-study findings.
Risk management	The website simply was not designed to handle the massive number of individual users. Plenty of missed opportunities to fix the website before its launch.
Procurement management	Primary contractor: CGI; 16 official subcontractors; a total of more than 55 different subcontractors. A complex procurement and awarding process was followed (Congressional Research Service, 2014), while post-failure investigation was performed on contractors' roles.
Stakeholders management	Client: Department of Health and Human Services (HHS); Others: CMS, HHS, 36 States, 300 private insurers, U.S. Chief Technology Office, GAO, Media, Citizens, Social Security Administration, the Internal Revenue Service, Veterans Administration, Office of Personnel Management, Peace Corps, etc.

The ICT contractor, most in question, that was responsible for the federal website was CGI, which is Canadian based company which had prior issues with a contact for the eHealth medical registry in the province of Ontario (Eichenwald, 2013). For Healthcare.gov, CGI had built a shopping and enrollment application to accommodate 60,000 simultaneous users, but U.S. federal government Chief Technology Officer Todd Park said "the site was overwhelmed by up to five times as many users in the first week" (Sun & Wilson, 2013). Some argue that there was not the appropriate funding for the website, Congress (legislative branch) only allotted $1 billion to build the health exchange, but the total estimated cost was five times that amount (InfoWorld, 2013). Contractors for the website testified before Congress that they did not conduct full testing of the website until a few weeks before the October 1st, 2013 launch.

Jeffery Zeints, a trusted advisor to President Obama, was tasked with fixing the website. Zeints claimed that the problem was not the volume of applicants, but there were performance problems across the website. By the end of November 2013 Healthcare.gov would work for the vast majority of users, according to Zients. President Obama himself in late October 2013 admitted that the website has not worked as smoothly as he had hoped. At first, White House officials blamed the glitches on the website to heavy volume, but later conceded that there were flaws in the software and system design (BBC News, 2013). There are numerous media accounts indicating that Obama was not fully informed about the progress of the website and CMS's ability to meet the October 1st, 2013 deadline.

The documented problems with the launch of Healthcare.gov are numerous but have been partially summarized by Thompson (2013), namely: (1) Unrealistic requirements—the website was extremely complex, one of the most complex ever created by the federal government; (2) Technical complexity: there were 55 contractors, 36 states, and 300 private insurers with over 4000 plans; (3) Lack of management leadership: there was difficulty with keeping the project on track, not effective leadership from HHS Secretary Sebelius and staff within CMS; and (4) Inadequate testing: with reports noting that the website was only tested two weeks before the launch, when it needed much more thorough testing. There were numerous add-ons to the website, just before the launch, which prevented a thorough testing of the system. Table 4 shows the key events before the launch of the Healthcare.gov website, according to mass media accounts and government reports on the project. As mentioned in Section 3, in the discussion of the research methods, the list of events was compiled by authors from a thorough Google search of news on the topic.

Table 5 shows the timeline of events after the launch of the Healthcare.gov website and associated failure reasons and factors. These events show the extent of problems with project management of the website and some of the solutions used to fix the website.

Tables 6 and 7 match the outcomes from the above analysis to the failure taxonomy tool (Tables 1 and 2) and depict which of the failure reasons and factors were found to have impacted the case. From this analysis, it is shown that project management failure was the major issue for these reasons: project definition was insufficient and required changes during its implementation; unrealistic scheduling was performed; the website required more proper handing due its organizational complexities. Moreover, project management appeared in the events (Table 5) to be the top-failure factor because of ineffective project definition –which is also a manner of project management in the scope management knowledge area. This factor is depicted in Table 7 followed by organizational and technical complexities.

Data from Tables 6 and 7 show that the examined case's failure was the result of ambiguous planning, overestimating political willingness, and most importantly the outcome of project complexity accompanied by ineffective project management. More specifically, it appears that

Table 4
Events before the launch of the Healthcare.gov.

	Event description
March 23, 2010	President Barack Obama signs the Patient Protection and Affordable Care Act (commonly known as Obamacare) into law.
March 1, 2013	Henry Chao, deputy chief information officer at Centers for Medicare and Medicaid Services (CMS), said at an insurance industry meeting that he was "pretty nervous" about the exchanges being ready by October 1, adding, "let's just make sure it's not a Third World experience." At the same event, his colleague Gary Cohen said, "Everyone recognizes that day one will not be perfect."
April 4, 2013	According to a 15-page McKinsey & Co. document, which only surfaced on November 13, and obtained by the Energy and Commerce Committee, Secretary Sebelius, CMS Administrator Marilyn Tavenner, and others were warned in a briefing that an ideal situation would be "end-to-end integrated operations and IT testing," but that the situation at the time was one with "insufficient time and scope of end-to-end testing." The document also cautions that a "limited initial launch" would be ideal, but that a "launch at full volume" was, instead, the plan, reported NBC News.
April 18, 2013	In committee testimony, Secretary Sebelius fails to mention the April 4 warnings from McKinsey & Co. Instead, she promises: "We are on track and the contracts have been led and we are monitoring it every step along the way… I can tell you we are on track."
April 30, 2013	Obama says the government is working hard to meet its deadlines on the rollout but signals the possibility of problems: "Even if we do everything perfectly, there'll still be, you know, glitches and bumps," he said.
June 19, 2013	The Government Accountability Office (GAO) says the health insurance exchanges may not open on time because they have missed deadlines and are behind schedule, including on testing the system.
July 16, 2013	Healthcare.gov Manager Henry Chao states in an email to CMS officials his low level of confidence in contractor work, saying, "I just need to feel more confident they are not going to crash the plane at take-off."
August 6, 2013	The Health and Human Services inspector general says in a report that the federal government is months behind in testing data security for the exchanges.
September 10, 2013	Obamacare is likely to have a "rocky" enrollment start on October 1 in some U.S. states because of ongoing technology challenges facing new online health insurance exchanges, W. Brett Graham of the Salt Lake City-based consulting firm Leavitt Partners says in testimony to a House of Representatives panel. At the same hearing, contractor CGI says it was on schedule to launch the federal exchange.
September 26, 2013	The Obama administration says that federal sites to offer health insurance to small businesses and to Spanish-speaking consumers are delayed. Obama said, "…most of the stories you'll hear about how Obamacare just can't work is just not based on facts. Every time they have predicted something not working, it's worked."
September 27, 2013	Obama said, "Those marketplaces will be open for business on Tuesday, no matter what, even if there's a government shutdown. That's a done deal."
September 30, 2013	According to the New York Times, documents released by House investigators reveal that the 'testing bulletin' suggested the website as of September 30 could handle only about 1100 users at a time, even though officials had said it should have been able to accommodate perhaps as many as 60,000.

government in an attempt to "force" its policy on time, it overestimated the abilities for project implementation, and it did not realize the project's scale and complexity, while its management was inefficient and ineffective.

All of the pre and post launch events shown in Tables 6 and 7 represent this case's partial failure caused mainly by execution (unrealistic scheduling) and content issues (technical complexity), which triggered the corresponding failure factors: ineffective project management, which prevented managers from establishing realistic deadlines and successful risk analysis during project planning (Pardo & Scholl, 2002). This factor was accompanied by various ICT reasons (data, complexity, many developers, etc.) and by unsuccessful monitoring and measurement, and of strong political willingness that impacted the launch and fixing of the website. All these findings show the efficiency of the failure taxonomy tool, which was defined in Section 2, to classify failure reasons and factors.

3.2. Twitter data analysis

This section provides answers to the second research question (RQ2) of this paper. More specifically, Twitter data analysis was performed in order to demonstrate the occurrence of the previously defined failure and corresponding timeline, as well as the impact of failure to the end-users, as expressed in social media discussions. Twitter was selected for the following reasons: it is based on short text messages that can be easily analyzed; it is highly popular, and it demonstrates users and issues of high impact on public opinion (Hao et al., 2011).

The data collection process was as follows: first, we utilized through Twitter API data for a period of 65 days from October 1, 2013 until December 5, 2013, when the media stopped documenting glitches. Data pre-filtering was based on the keywords "Healthcare.gov" and "Obamacare website". Second, data analysis took place by using HTCondor, a software tool, with the purpose of documenting the following outcomes: number of tweets, which demonstrates audience reaction; number and ratio of re-tweets and mentions that illustrates influencers in opinion making and major issues with regard to social reaction (Fig. 4), as well as basic information on names and contribution percentages of influencers.

3.2.1. Timeline of tweet activity periods

The above analysis demonstrated 10 peak tweet activity periods during the examined timeframe. These have an intricate relationship with the events of Table 4, as will be discussed. The ten peak periods are illustrated in temporal order as shown in Table 8.

3.2.2. Relations between social media tweet activity and real-world events

In Table 8, the peaks are ranked in decreasing order of total tweet volume. Their alignment with the main events E1-E22 from Table 5 is shown in the last column of this table. It is interesting to note that four types of temporal relations between peak activity periods Mi and real-world events Ej exist. Most importantly, these temporal relations could be interpreted as bearing evidence of potential causal links between external events Ej and public opinion peaks Mi. In more detail:

a) Mi after Ej: (one day after): An indication of a potential effect, that the real-world event caused from the reaction of public opinion, as witnessed by the tweets;
b) Mi on Ej: A strong indication of correlation between the event and the public opinion reaction. Usually the event causes the public reaction; more seldom the reaction causes a counter-event; and often whole unfolding sequences of events with temporal overlap are in interplay with corresponding reactions (e.g., M5 and E5, E6, E7, E8, and E9);
c) Mi before Ej: (one day before) A potential interrelation between the public opinion on Twitter and an event caused by it, for example, through a governmental or media reaction to a public opinion peak; and
d) Mi between Ei and Ej (with significant temporal distance from both): Usually a surge of public opinion during news "silence", not directly causality related to either Ei or Ej.

There are also other more complicated possibilities; for example, an event negates (finishes off) a strong current of public opinion, for the case of c) (Mi before Ej), when there was previous temporal duration of the activity which is cut during and after the event.

Table 5
Events after the Healthcare.gov website launch and failure reasons and factors.

ID	Event	Failure reason	Failure factor
1.	October 1, 2013*: The $630 million HealthCare.gov online insurance marketplace goes live and crashes minutes after launch. Technology problems and heavy Internet traffic stall the launch of the new online insurance exchanges, with the federal Healthcare.gov site inaccessible to millions of Americans. President Barack Obama compares the website's issues to the "glitch" rollout of the latest Apple operating system.	Execution issues: Unrealistic schedule and/or reactive planning. It is recognized that product testing was not sufficient.	Project Management issues: weak definitions of requirements and scope. It is recognized that technology problems and unexpectedly heavy Internet traffic have been occurred.
2.	October 5, 2013: Todd Park, U.S. Chief Technology Officer, blames the initial issues with the HealthCare.gov website on excessive simultaneous demand by individuals looking to find insurance plans through the site.	Design–reality gaps: hard-soft gaps since unexpected simultaneous social demand occurred. Execution issues: Unrealistic schedule and/or reactive planning since an efficient testing period would resolve it	Project Management issues: weak definitions of requirements and scope; unsuccessful monitoring and measurement. ICT reasons and system development process Careful requirements definition would resolve this problem.
3.	October 13, 2013: White House Chief of Staff Denis McDonough adds a nightly 7 o'clock meeting in his office to demand updates. According to the New York Times, "For weeks, aides to Secretary Sebelius had expressed frustration with Mr. McDonough, mocking his 'countdown calendar,' which they viewed as micromanagement."	Content issues: Project scope definition, change management, shifting requirements and or/technical complexity Sudden update demands reflect missing definitions and changes.	Project Management issues: unsuccessful monitoring and measurement Sudden update demands reflect missing definitions and inappropriate monitoring.
4.	October 17, 2013: Regular federal government operations resumed.		
5.	October 21, 2013: Obama makes a speech in the White House Rose Garden to discuss the Obamacare website as well as explaining the enrollment process.		Politics: Government and top-level leaders' commitment is validated It is validated that it is a politically mission-critical project
6.	October 22, 2013: With Healthcare.gov's technology problems continuing into a third week, President Obama names trusted adviser Jeffrey Zients to run a "tech surge" of experts to fix the website.	Skill issues: Project unaligned team and/or lack of skills. An extra team of experts has been requested.	Project Management issues: inefficient risk analysis and management; unsuccessful monitoring and measurement Such a failure risk had not been presumed, since the crisis lasts 3 weeks.
7.	October 22, 2013: In a CNN interview with Dr. Sanjay Gupta, Secretary Sebelius claims that the first time President Obama learned of the Healthcare.gov problems was "the first couple of days" after the site went live on October 1, 2013. "But not before that?" Dr. Gupta followed up. "No, sir," said Sebelius.	Execution issues: Unrealistic schedule and/or reactive planning It is recognized that product testing was not sufficient.	Project Management issues: inefficient risk analysis and management In case of prior risk recognition, the President would be informed of the consequences.
8.	October 24, 2013: Republican opposition to the law turns to exposing the failed launch of Healthcare.gov, beginning with a hearing of the House Energy and Commerce Committee focused on CGI and other government IT contractors. They testify that they had only two weeks to test the new system behind Obamacare, compared with weeks, or months, as would be expected for such a large project.	Execution issues: Unrealistic schedule and/or reactive planning It is recognized that product testing 2-week was not sufficient.	Project Management issues: Underestimate of timeline; weak definitions of requirements and scope It is recognized that product testing 2-week period was not sufficient.
9.	October 25, 2013: White House adviser Jeffrey Zients declares the federal Healthcare.gov website "fixable" and says it would be operating smoothly by the end of November.		
10.	October 26, 2013: QSSI Inc. is selected as the contractor responsible to now oversee federal website fixes.	Skill issues: Project unaligned team and/or lack of skills. An extra contractor has been selected to contribute with its skills.	Project Management issues: unsuccessful monitoring and measurement Such skills requirements should be identified and addressed before project completion.
11.	October 27, 2013: An outage at the data center hosting federal data stops enrollment across the country and brings down Healthcare.gov for a day.	Content issues: technical complexity. A single data center brings down the mission-critical website and should be presumed and avoided.	ICT reasons and system development process: Problems with regard to infrastructure and data
12.	October 29, 2013: Centers for Medicare and Medicaid Services (CMS) Administrator Marilyn Tavenner testifies before the House Ways and Means Committee on the failed launch of the Obamacare website and assures the public that the website can be fixed.		Politics: Government and top-level leaders' commitment is validated Top-level political speeches are given.
13.	October 30, 2013: Secretary Sebelius apologizes for the botched launch, calling it a "debacle," and says that she should be held responsible for the problems.		Politics: Government and top-level leaders' commitment is validated Top-level political speeches are given.
14.	October 31, 2013: The Obamacare website crashes for the second time in a week — during Secretary Sebelius' testimony to the House Energy and Commerce Committee.	Execution issues: Unrealistic schedule and/or reactive planning Second problem within a week would be avoided in case or a careful planning. Skill issues: Project unaligned team and/or lack of skills. Extra experts contribute with their skills to maintenance.	Project Management issues: unsuccessful monitoring and measurement Second problem within a week would be avoided in case or a careful planning. ICT reasons and system development process: Problems with regard to infrastructure and data Extra experts contribute with their skills to maintenance.
15.	November 3, 2013: HHS announces the Healthcare.gov will undergo maintenance every night until improvements are made to the site.	Execution issues: Unrealistic schedule and/or reactive planning Such an announcement would not be necessary if it was presumed.	Project Management issues: unsuccessful monitoring and measurement Such an announcement would not be necessary if it was presumed.
16.	November 4, 2013: The enrollment and application system for the Obamacare website crashed for 90 min after an overload of a small amount of servers.	Execution issues: Unrealistic schedule and/or reactive planning A small amount of servers should not	Project Management issues: unsuccessful monitoring and measurement A small amount of servers should not result to a failure in

Table 5 (*continued*)

ID	Event	Failure reason	Failure factor
		result to a failure in case of a careful project definition and planning. Content issues: technical complexity. It is validated that project structure is complex and a partial failure impacts the entire system.	case of a careful project definition and planning. ICT reasons and system development process: Problems with regard to infrastructure and data It is validated that project structure is complex and a partial failure impacts the entire system.
17.	November 7, 2013: Obama apologizes for making promises that he couldn't keep. He tells Chuck Todd of MSNBC, "I am sorry that they are finding themselves in this situation based on assurances they got from me."		Politics: Government and top-level leaders' commitment is validated Top-level political speeches are given.
18.	November 13, 2013: HHS releases figures for Obamacare enrollment for the first time, estimating around 106,185 people have enrolled in a plan, with only about 26,794 enrolling through the federal website.	Execution issues: Unrealistic schedule and/or reactive planning Such figures should be estimated and given earlier.	Project Management issues: Underestimate of timeline; weak definitions of requirements and scope; Such figures should be estimated and given earlier.
19.	November 14, 2013: President Barack Obama claims in a White House press conference: "I was not informed directly that the website would not be working as—the way it was supposed to. Had I been informed, I wouldn't be going out saying, 'Boy, this is going to be great.' You know, I'm accused of a lot of things, but I don't think I'm stupid enough to go around saying, 'this is going to be like shopping on Amazon or Travelocity,' a week before the website opens, if I thought that it wasn't going to work. So, clearly, we and I did not have enough awareness about the problems in the website."	Execution issues: Unrealistic schedule and/or reactive planning The President was not informed; The project team underestimated the outcome and was not prepared for the failure.	Project Management issues: Underestimate of timeline; weak definitions of requirements and scope; inefficient risk analysis and management; unsuccessful monitoring and measurement; communications management problems. The President was not informed; The project team underestimated the outcome and was not prepared for the failure. Politics: Government and top-level leaders' commitment is validated Top-level political speeches are given.
20.	November 29, 2013: President Obama says in an ABC News interview with Barbara Walters, "We're evaluating why it is exactly that I didn't know soon enough that it wasn't going to work the way it needed to. But my priority now has been to just make sure that it works."	Execution issues: Unrealistic schedule and/or reactive planning The President was not informed; The project team underestimated the outcome and was not prepared for the failure.	Project Management issues: Underestimate of timeline; weak definitions of requirements and scope; inefficient risk analysis and management; unsuccessful monitoring and measurement Politics: Government and top-level leaders' commitment is validated Top-level political speeches are given.
21.	November 30, 2013: Enrollment statistics for the HealthCare.gov website show that only around 137,000 individuals had signed up for plans using the site compared to the 227,000 that had enrolled through the 14 state run exchanges.	Execution issues: Unrealistic schedule and/or reactive planning Such figures should be estimated and given earlier.	Project Management issues: Underestimate of timeline; weak definitions of requirements and scope; Such figures should be estimated and given earlier.
22.	December 1, 2013: Self-imposed Obama Administration deadline to have the Healthcare.gov website working for the "vast majority" of users.		

* October 1–16, 2013: United States federal government entered a shutdown.

Some examples of the above relations from the dataset, together with explanations, follow:

Example 1. Public opinion M1d1 peak day of October 4th, 2013, seems to be the outcome of the real-world event with ID 1, regarding Healthcare.gov launch, since most tweets refer to site's roll out according to planning and initial glitches and user disappointment are reported. Similarly, M1d3 peak day of October 13th, 2013 has references to event with ID 3 and to a New York Times' article.

Example 2. M5d2 peak day of October 22nd, 2013 has direct relation to the real-world event with ID 6 and 7, which are reported on the same day. Mass media report website's failures due to unrealistic planning and people express disappointment on these failures.

Table 6
Failure reasons with impact on the examined case.

Failure reason	With impact	Findings
Design–reality gaps	×	The overall planning was overestimated and unrealistic to be established within the timeframe started from Affordable Care Act law signing. Limited initial launch was suggested but government preferred the full launch.
Missing focus	×	Even today, government redefines its respective policies (Armour, 2014)
Content issues	×	Requirements were changing and technical complexity existed.
Skill issues	×	Complex project organization and too many contractors.
Execution issues	×	Unrealistic scheduling, which was shifting due to continuous delays in milestones.
Regulatory issues		Clearly defined regulation framework (known as the Affordable Care Act) supported the project.
External factors		None
Missing user satisfaction		More than 5.4 million people have registered and obtained insurance coverage via the website (Armour, 2014), while 77 insurers offer corresponding services across 44 States.

Table 7
Failure factors with impact on the examined case.

Failure factor	With impact	Findings
Organizational power	×	Too many stakeholders were involved, which had to be aligned to project mission.
Politics		Clear and supportive but overestimated.
Education		
Project management issues	×	Lots of project management gaps and inefficiencies.
Ambiguous business needs and unclear vision	×	Even today, government redefines project mission (Armour, 2014).
Security and privacy		
Finance and operational costs		
ICT reasons and system development process	×	Technology problems and heavy Internet traffic stall the launch of the new online insurance exchanges.

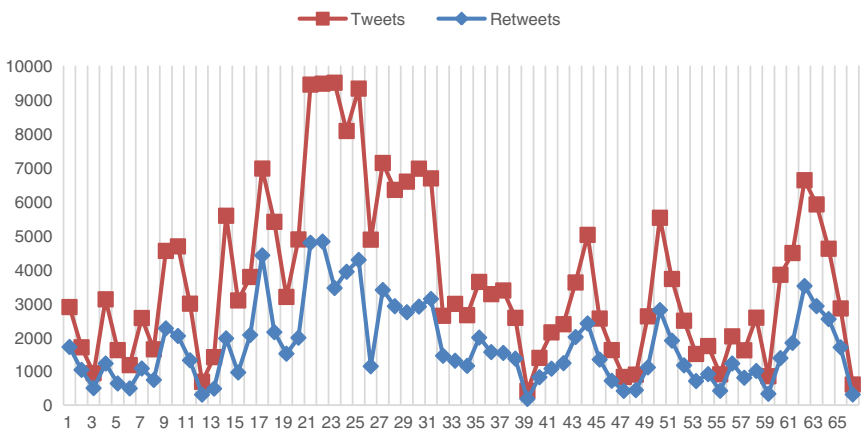

Fig. 4. Timeline of number of tweets (red) versus number of retweets (blue) for the examined period (Day1 = October 1, 2013 and Day66 = December 5, 2013). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Example 3. The event with ID 15 on November 3rd, 2013 seems to have been triggered as a result of the public opinion peak days M6d1 to M6d5. This event's appearance seems to be part of a communications management processes during project implementation. However, as this was delayed significantly (after a month of failure events), this could provide evidence of the lack of a corresponding proactive communications management plan. Such an event should have appeared much earlier and could potentially have controlled the extent of Twitter complaints. Note that a similar communications management process action appears to have taken place on November 14th, 2013, and successfully resulted in complaints elimination on Twitter.

Example 4. Peak days M7d1 to M7d3 reported server crashes event with ID 16 on November 4th, 2013 and complaints about unrealistic project scope and requirements were reported. These peak days stopped after the appearance of the event with ID 17 on November 7th, 2013, when President Obama apologizes for making promises that he could not keep, which is a normal crisis management approach (see Table 5).

3.2.3. Top influencers on Twitter

The second part of RQ2 examines the capability of social network analysis to demonstrate the failure impact on the audience. In this context, the Twitter analysis revealed the role of Top Influencers in opinion making for our case study. More specifically, apart from the temporal structure of the peak activity periods, and their relation to events, it appeared that twitter comments are "gathered" around some particular people instead of being numerous independent end-user reactions. This is a very important observation, which has not been examined in the project management literature in the context of examining Twitter data. In this section we analyze who is moving public opinion, as witnessed by examining retweets.

An analysis of the top ten influencers for the month of October, 2013 illustrates in Table 9 that there were three individuals that were most influential, and by a significant gap compared to others. For example, the ratio of retweets between two successive influencers below position 4 (influencers with ID 5 to 10) is always less than 1.3, which is the average ratio of retweets between top 4 influencers. Furthermore, the total retweets/mentions of the top 3 influencers are approximately 13,600; while the total sum of the next 6 is on the order of 7500, which is almost half compared to the top influencers; retweets of top 3 influencers have been generated by twice as many users than the remaining 7 influencers.

In the data analysis authors also examine who are the top influencers and are they average citizens, media, politicians, or opinion makers. This is highly relevant to research question RQ2, (i.e., using social media to demonstrate e-government project failures and demonstrating failure impact to the end-users). This is the case, as the literature suggests, because a careful pro-active communications management process is a pre-requisite for e-government project success. In our example, there is very strong twitter-based evidence of a well-orchestrated communications management process by the opposition; however, this comes without effective handling or counter-measures by the government.

As shown in Table 9, the first three influencers are:

1) Iowahawkblog: David Burge, a conservative blogger with over 91 thousands followers on Twitter.
2) Realdonaldtramp: A fake account of Donald Trump, an American businessman, investor, television personality, who is currently a Republican, but formerly has been a Democrat.
3) sentedcruz: The Republican Senator Ted Cruz from Texas.

Table 8
Peak tweet activity periods and corresponding events.

Peak	Days	Rank	Dates	Volume	Density	Related Events
M1	1	10	Oct 4	3119	3119	1 day before E2
M2	2	6	Oct 9–10	9223	4611	Midway between E2 and E3
M3	1	9	Oct 14	5580	5580	1 day after E3
M4	1	8	Oct 17	6970	6970	On E4
M5	5	1	Oct 21–25	45,814	9162	On E5, E6, E7, E8, E9
M6	5	2	Oct 27–31	33,711	6742	On E11, E12, E13, E14
M7	3	5	Nov 4–6	10,281	3427	1 day after E15, On E16, 1 day before E17
M8	2	7	Nov 12–13	8632	4316	On E18, 1 day before E19
M9	3	4	Nov 18–20	11,857	3952	Midway between E19 E20
M10	5	3	Nov 29–Dec 3	25,474	5095	On E20, E21, E22

Table 9
Top ten influencers.

ID	Influencer	Retweets/mentions
1	Iowahawkblog	5425
2	Realdonaldtramp	5271
3	Sentedcruz	2946
Partial sum S1..3		13,642
4	Cnnbrk	1647
5	Twitchyteam	1384
6	Theblaze	1347
7	Newsmax	1136
8	Patdollard	1033
9	Kesgardner	877
10	Jimmyfallon	473
Partial Sum S4..10		**7897**

Among the other seven in the top 10, still there are a number of well-known Republican personalities. Most of the opinion leaders that get heavily retweeted were well-recognized Republican personalities, who already enjoyed large coverage from traditional media outlets. Furthermore, there was a minimal defensive counter stream in Twitter during the period of the incident; the "anti-Obamacare" tweets, orchestrated by the top influencers, by far outmatched any opposite or neutral voice. These findings justify further that project planning was insufficient, since an effective communications management plan should have focused on social media as well. More specifically, Twitter analysis showed that some proper government statements partially eliminated opposite discussions, but they seem not to have occurred systematically, since they happened only during some of the failure events. A proper communications plan through social media would have mitigated such an effect systematically and provided more effective responses.

4. Discussion

This paper examined two research questions in the context of e-government project failure. The first research question (RQ1) examined the reasons that lead to –as documented by scholars– extensive rates of e-government project failures. The literature research method returned failure reasons and a factors taxonomy tool, which were presented in Tables 1 and 2. This taxonomy tool was tested in the second research method, regarding the case-study analysis of the Healthcare.gov. The presented case study shows a partial at-completion failure, since the project was not abandoned (partial failure), while it occurred in the end of project's implementation phase (at-completion failure). According to the mass media analysis and data from official federal government sources, various factors resulted to this failure:

- overestimated the political will, created a major design–reality gap regarding the required performance against the potential number of users;
- this project was a large-scale one due to its budget and extremely complex because of its technical requirements and large number of stakeholders, while the overall planning and management did not focus on these characteristics (i.e., day-to-day effective project micro-management, initially defined extended timeframe, and so forth);
- shifting requirements for system's performance and developers' skills resulted in project scope's changes; and
- Failures in budget and time control illustrate that an inappropriate and inefficient project management methodology was followed.

These planning and management problems show that political will and legislative support were not enough to secure project success. The overall failure seemed to have lasted about two months, which was an efficient timeframe to question the project's effectiveness to serve citizens. Recent articles (Armour, 2014) claim that a significant number of citizens and insurers have registered through the Healthcare.gov website, which could be the outcome of user satisfaction. However, this fact is not enough to ensure user satisfaction, since existing studies (Reddick & Anthopoulos, 2014) demonstrate that end-users prefer e-government services mainly when they are obliged to use them, Healthcare.gov users are obliged to register in order to gain health insurance.

The second research question (RQ2) of this paper asks if social media data analysis, such as Twitter, be used to determine the impact of e-government project failures on end-users. The third research method was followed and a Twitter analysis effectively demonstrated that the failure took place in our chosen case study. More specifically, the respective data mining showed the occurrence of this partial and at-completion e-government project failure and matched the failure timeline of events to respective reactions on Twitter. Additionally, the outcomes from the analysis illustrated that the audience of end-users expressed their feelings against such an incident, but not independently. On the contrary, a small number of potentially well-orchestrated opinion makers played leading roles in influencing the behavior of tweeting users. This particular role of top-influencers demonstrate that social media often do not clearly express individual audience feelings, but end-users feelings and corresponding tweets might be strongly affected by opinion makers, which were lopsided towards fierce opposition to the policy.

The Twitter analysis method showed that managers of e-government projects can realize the occurrence and impact of failures from online discussions, and they should account for audience's behavior and respond properly with an appropriate communications management plan.

Finally, a typology of social media effects is shown in Table 10. The shifting audience behavior justifies that project managers and especially government should be aware of each of the four categories in Table 10 and should pro-actively prepare a corresponding reaction in their communications management plan during mission-critical e-government projects. This finding is especially important given the power of social media, such as Twitter, to drive the conversations and media coverage.

5. Conclusions

This paper deals with the problem of e-government project failures. Various scholars have already discussed this issue, but the existing solutions that have been proposed have not resulted in a significant decrease of this phenomenon. Various types of failures appear even on projects that have strong political and legal support, such as our examined case of Healthcare.gov website.

This paper answered two research questions. The first question addressed e-government project failure sources and a literature review methodology created a taxonomy tool, which summarizes failure reasons and factors. This tool comprises a valuable checklist of avoidances for all future e-government projects, since it is based on theory, lessons-learned and experiences from various scholars and cases. In an attempt to test this taxonomy tool, the case-study of Healthcare.gov was analyzed on the basis of the failure reasons and factors.

The second research question addressed the efficiency of the social network analysis method to examine e-government project failure on the end-users behavior. As such, Twitter data mining was utilized on the previously defined case-study. The findings from this analysis matched the extracted timeline, which shows the importance of this method to demonstrate an e-government project failure. Additionally, a taxonomy of events was composed, which showed the bi-directional interrelation between real-world events related to the project failure and public opinion surges on Twitter. With regard to the capability of social media analysis to depict the impact of failure on the end-users' audience, findings showed that people express their feelings against failure, but they are highly influenced by a small number of opinion makers. This finding implies that project communications management has to more fully embrace the role of social media.

However, various limitations of this study should be mentioned. More specifically, this social media methodology was applied only on

Table 10
Typology of social media effects.

Typology index	Explanation
Peak day after the occurrence of a failure event	Indication of potential causal link: real-world event causes Tweets
Peak day simultaneously to a failure event	Indication of potential correlation; also either direction of causality possible
Peak day between two events	Usually surge of public opinion during news "silence"
Peak day prior to an event	Indication of potential causal link: Tweets (Public Opinion surge) causes real-world event – governmental reaction

one case study, which although is a representative project of high impact, cannot secure its generalized applicability to other cases. For instance, failures in developing countries with low levels of social media use could perhaps not be demonstrated effectively in these research findings. Additionally, Healthcare.gov was a case with significant political impact, which attracted enough attention from mass media and opinion makers, who were willing to comment or discuss such a failure on Twitter. This high impact case is not common for most e-government project failures. The authors of this study recommend that future research should examine our taxonomy tool in different contexts and countries.

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