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A WORKFLOW MODEL TO SUPPORT LOCATION BASED PARTICIPATION TO POLICY MAKING PROCESSES

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Abstract

This paper aims to propose PMWF model, a new workflow model to automate ubiquitous policy making processes and facilitate citizen participation. While workflow technology has been widely adopted in public sector, the use of technology is mostly limited to supporting back-end administrative business processes. PMWF model targets front-end policy making processes that require active participation of large number of citizens. Automatic delivery of relevant policy issues into citizen’s life is expected to enhance their participation in policy formulation and implementation processes. PMWF model provides modelling constructs to link back-end admin tasks by policy makers to front-end opinion tasks whose main actors are citizens. The core constructs for linkage is opinion-tag which contains policy issues and is attached to geographical objects so that citizens can identify relevant policy issues in the middle of their every-day life patterns. The proposed model is applied to real world policy making processes in the UK and Turkey to show its generality.

Keywords: workflow model, policy making process, e-participation, role resolution.
1 Introduction

Workflow management systems (WFMSs) have been widely adopted in private sector to automate business processes (BPs) during the last two decades. The benefits of WFMS have also been appreciated by public sector, and the technology is being adopted to automate back-end business processes of public agencies. However, contemporary WFMSs have limitations in the automation of front-end policy making processes (PMPs) in public sector in which huge number of citizens needs to be encouraged to cast their opinion voluntarily as major actors of the processes. Current workflow models being used to represent the business process execution logics need to be extended to incorporate such voluntary business actors in their modelling constructs. This paper aims to propose a new workflow model that incorporates citizen’s every-day life patterns on a geographical map allowing citizens be involved in policy making processes in the middle of their every-day life via portable computing devices.

Predominantly, the government mandates to involve citizens in PMPs with citizen preferences and values for effective policy formulation (Renn et al., 1993). PMPs are made up of sub processes that postulate efficient and systematic communication and coordination among sub processes (Lindblom, 1959). WFMSs have been adopted in the private sector to facilitate business processes and have been transferred to the public sector as well. There exists few studies on business process management (BPM) in public sector and some of these signify the importance of re-engineering of business processes in public sector (Osborne and Gaebler, 1992). However, there is no study in literature that applies workflow system to PMPs. Despite the importance of WFMS in public sector, the utilization of workflow system has been limited to supporting administrative functions, giving up immense potential to automate PMPs. Location based e-participation approach allows citizens to access issues in the middle of their everyday lives without imposing social control. This automatic delivery system and ease of access to relevant policy issues into citizen’s life is expected to enhance citizen participation in policy formulation. Access to information and innovation is considered driving factors of positive participation (Choudrie and Dwivedi, 2005). Moreover, location based e-participation builds a connection between the citizen and the government. Canada has seen most maturity in its e-government and this is because it has kept itself connected to the citizens (Kumar et al, 2007).

The quality of citizen feedback when participating voluntarily yields high quality input for policy formulation, resulting into effective policies, in contrast to traditional methods where citizens are mandated to participate by the government. Also, contrary to private sector business processes, PMPs require the involvement of large number of citizens and casting of opinion is not a mandatory task, therefore it cannot be inserted into their task box as it is done in business processes. In PMPs, there is cooperation between policy makers and large number of citizens which necessitates addition of new modelling constructs for effective utilization of WFMS in PMP. Furthermore, longer duration of a task to complete causes complexity in status update, role resolution, tracking service and more sophisticated attributes are required for task specification.

In this paper, a new workflow model, called PMWF, is proposed. PMWF allows citizens to participate in policy making processes that are related to their current location which also motives participation. For this, opinion-tag concept is integrated into the workflow model that allows workflow modeller to relate policy issues with geographical objects. This enables policy makers to collect feedback with regards to site objects at large scale and for citizens to track the impact of their opinion on related policy making process.

The scope of the paper is to propose a new policy making work flow model that can be used to automate policy making processes (PMP) and can be applied to real world examples. It allows policy makers to define executable PMPs in connection with citizen’s context and points-of-interest model, which defines points-of-interests which citizens frequently visit during their every-day life on a geographical map. It is applied to exemplary policy making processes in UK and Turkey to test its feasibility and generality.
The paper is composed as: section 2 briefly reviews related literature. In section 3, details of PMWF framework is described. Section 4 provides exemplary specification of the model and finally section 5, concludes the paper with discussion and conclusion.

2 Literature review

Workflow management system has received immense attention by practitioners in the industry and academicians during the early 1990s (Lee et al., 1999). In its simplest definition WFMS is a system that transits required information, documents and tasks from one employee in an organization or one machine to another (Wescott, 2001). It is responsible for routing the task according to the predefined conditions by the organization, before it can be forwarded to the next actor or before the task can be assigned as completed. Moreover, the automation capability of WFMS is seen as beneficial for overall operations in organizational settings (Sell and Braun, 2009). Among the many benefits affiliated with WFMS, application flexibility, integration, reusability and reduction in operation cost are incentives for using WFMS (Georgakopoulos and Hornick, 1995). It not only represents the BPs but carry out processes in an efficient and effective manner (Antonacci and Goekte, 2011). Other advantages of implementation of process management are prioritising resource allocation, enhanced performance and effective implementation of process oriented systems (Gulledge and Sommer, 2002). E-government BPs is considered to be highly complex, as a number of actors such as citizens, administrative staff, authorities etc., are involved with varied BPs. In public sector, the adoption of Business process system is present in different domains, such as police force, Army and Defence, hospitals, universities etc (Kerschner and Raaf, 2008). However, in the e-government context, the use of WFMS has not been fully utilized. The automation of effective communication and coordination between the policy makers and citizens yields quality policy sets. The field of public participation has provided a plethora of methods for engaging public in decision making processes (Hampton, 1999). E participation is one field, in government sector, that needs restructuring for government- citizen collaboration (Sajjad et al., 2011).

Workflow models are based on modelling formalisms which can be categorised into three approaches: IPO, Petri-nets and rule based approach. Most of the literature talks about input-process-output (IPO) approach (Wolf and Reimer, 1996) and Petri nets (Petri, 1962). But the analysis and verification of the models with this approach is not easy. Hofstede et al. (1998) has found verification issues while using Petri nets for workflow specifications. With Petri nets workflow termination can be verified along with presence of dangling tasks, however, to possibly find the correct routing condition and mapping rule between the actors and roles is difficult (Lee et al., 1999). The rule-based approach for workflow modelling, despite of its some advantages has scalability issue of WFMS.

One of the most important functions of WFMS is to assign tasks to eligible users. It is not only deployed in small group setting but also large enterprises. When large number of users are involved the role resolution becomes complex. This is due to different users having different roles in life and to qualify a user to carry out a task needs specifications for roles. Roles are defined as capabilities and privileges required by the user to properly execute the task (Muehlen, 2004). Curtis et al. (1992, p.76), defines a role as “a coherent set of process elements to be assigned to an agent as a unit of functional responsibility”. The criteria used to determine who qualifies for a task is manifold in literature. Some of the approaches are policy resolution architecture for specifying task assignment rules; role based access control to secure web based WFMS (Ahn et al., 2000); object oriented organizational model to support role resolution in e-commerce (Cheng, 2000). However, ubiquitous participation in PMP requires involvement of as many citizens with different roles as possible, taking into account citizen context and geographical location.

Policy making process to effectively utilise workflow models for e-participation, the above mentioned limitations prevalent in the extant models needs to be overcome. Moreover, there is a lack of smarter approach in the literature suggesting how to penetrate into citizen’s lives without creating a feel of social control. Workflow model generally automates the entire business process, whereas for policy making processes workflow model should be able to prioritise the tasks and execute accordingly rather than fully automating the processes. This paper has considered the above mentioned mandatory
factors along with the gaps extant in the contemporary models for implementation of workflow system to ubiquitous policy making process and has proposed policy making workflow framework (PMWF). Also, two important constructs: opinion tag and role resolution with rule specification approach, has been added to the workflow model which has not been considered in the past for feedback collection and qualifying citizens.

3 Policy Making Workflow Framework

This paper adopts design science approach to provide a novel solution for applying WFMS in PMPs. In order to do so, we identify problems, in applying WFMS in PMPs and propose a novel solution (PMWF) to solve the issues. The goal of PMWF modelling framework is to allow end users (policy makers) define executable PMPs in connection with citizen’s context which defines citizens’ everyday life pattern and points-of-interest model citizens frequently visit during their everyday life on geographical map. Following points highlight the major differences between the BP and PMP which necessitates the development of a new PMWF model.

Firstly, the completion of task in PMP has a longer duration due to large number of citizens involved than BP where task is assigned to one or more actors. The status of task in BP is simple, once allocated to the actor it changes from ‘assigned’ to ‘completed’ on its completion. However, in PMP due to large number of citizen involvement creates complication for status updates. For example, the status of the task can be changed when pre-defined conditions are met. One simple example of such tasks is “Public consultation on submission of DPD and sustainability appraisal report” which is one of tasks of “the Urban Planning: Land Use” process of the South Yorkshire in the UK. The task requires obtaining feedback from large number of citizens and/or groups on a DPD and the completion of the task is determined depending on the number of citizens (or groups) involved in the task and the quality of the feedback received (need to filter out any noises like commercial advertisement or irrelevant input).

Secondly, the specification of task information requires more sophisticated attributes then BP task as the duration of task is longer and there are conditions to complete the task that needs to be defined.

Thirdly, the role resolution in PMP is not straightforward as in BP. In general BP, a task instance is allocated to a particular role or a team in an organization. Any actor that qualifies for the role will be able to execute the task instantly. However, in PMP task instances that require large number of citizen involvement will have to allow as many citizens with different roles that can be involved in the task execution. The role resolution algorithm also needs to consider how relevant citizens are involved in opinion collection, in the middle of their everyday life. That is, each policy issues and its processes need to be linked with citizen context information. Therefore, any relevant policies are provided to the citizens at the right time at the right places. This requires additional models that represent citizen contexts and geographical information which will be used by the role resolution logic.

Fourthly, in BP, a tracking service is used to inform who executes the task and what were the results obtained hence with. The tracking service for PMP is difficult due to large number of citizen involved for the task completion. As the tracking service needs to provide information out of the large pool of citizen, who provided what input, the collective results and impact on the final decision. Moreover, in PMP where citizen involvement is not restricted to one task, a tracking service needs to link information between two or more tasks. For example, citizen feedback on agenda setting and agenda collection of citizen feedback on proposed policy draft.

The transition of the internet to computerized devices has opened gates to numerous applications on handheld devices. Applications like GPRS allows more sophisticated applications to work in collaboration with internet, revealing immense potential of location based participation. Such online location based participation systems brings citizens closer to government and enhances participation (Kingston et al., 2000). Common methods in traditional public participation involve public participations in meetings with confrontation environment. It results in less vocal majority who represents entire public (Healey et al., 1988). Limitations of time and location are yet another factor of discouragement of public participation. Location based citizen participation encourages citizen’s
engagement with information, policy issues and participation which has no geographical restrictions. It reduces factors causing hindrance in participation by eliminating time, location, confrontation limitation factors and enhances public participation in PMP.

The core of the PMWF framework is policy making process model (PMPM) which is an executable policy making processes including at least one task that requires involvement of large number of citizens for opinion collection. PMP model defines essential information for the execution of PMPs to provide status tracking services to citizens and policy makers. On the other hand, a, point-of-interest model (POIM), defines any geographical objects (points-of-interest) that can be connected to opinion tag which is a part of a PMPM.

Figure 1. The overall view of the PMWF framework.

Formally, the PMWF framework is defined as follows:

$$PMWF = <PMPM, POIM>$$

where PMPM is policy making process model and POIM is a point of interest model.

PMPM is a sub model that specifies the procedural structure of a PMP. An instance of PMPM, $pmpm$ is defined as

$$pmpm = <pn, pd, T, TR, RO, F, OT>$$

where $pn$ is policy name, $pd$ is a policy description, $T$ is a set of tasks, $TR$ is a set of transits that links two or more tasks to define the sequences of the related tasks, $RO$ is a set of actors who are assigned with one or more tasks of the workflow, $F$ is a set of forms used in the workflow, and $OT$ is a set of opinion-tags that are attached to POIs on a geographical map.

Policy name $pn$ and policy description $pd$ are published to citizens. Each constructs of a PMP are also described as a tuple as follows. Firstly, a task $t$ is defined as

$$t = <tn, rn, PoC, inpf, outf, ot>$$

where $tn$ is a task name, $rn$ is a role name which is responsible for the task, $PoC$ is post condition that specifies when the task is completed, $inpf$ is the name of an input form, $outf$ is the name of an output form, and $ot$ is an opinion tag. A transition $tr$ is defined as follows.

$$tr = <st, dt, AR>$$

where $st$ is the name of a source task from which the transit receive process control, $dt$ is the name of the destination task to which the link passes the workflow control, and $AR$ is a set of activation rules that define when the transit is activated to pass the workflow control from the source task to the destination task.

$$ro = <rn, RoR>$$

where $rn$ is role name and $RoR$ is a role resolution rule that is used to find qualified actors for the task.

$$f = <fid, fname, ATTR, R>$$

where $fid$ is a unique form id, $fname$ is form name, $ATTR$ is a set of attribute specifications, and $R$ is a set of roles that can access the form.
An attribute in the PMP is either branch or leaf attribute. A leaf attribute is an attribute that can have value while a branch attribute has one or more branch or leaf attributes.

branch_attr = <id, name, parent_attr> and

leaf_attr = <id, name, parent_attr, type, value> where id is a unique identifier of the attribute, name is the attribute name which is shown on the form, parent_attr is the name of the parent attribute which owns the attribute, type is the data type of the attribute, and value is the value of the attribute.

Role specification in a form specification consists of role name and access right as below. A role specification

\[ r = <\text{name, access}\> \text{ where } \text{name} \text{ represents a role name and } \text{access} \text{ can have either “write” or “read”}. \]

\[ ot = <\text{oid, otype, pol-issue, ot-r, att}\> \text{ where oid is a unique identifier of an opinion tag, otype represents the opinion type, pol-issue is a composite construct to specify policy issue, ot-r is a role name that can access to the opinion-tag, and att is an attachment specification to link the opinion-tag to POIs on a geographical map. More specifically, an instance of policy issue pol-issue is defined as} \]

pol-issue = <\text{pid, short-desc, long-desc, question, OPT, comment}\> \text{ where pid is a unique policy issue, short-desc is a short description of the policy issue, long-desc is a long description of the policy issue, question is used to guide citizen response, OPT is a set of options which citizens can choose from if the opinion type is “voting” or “vote-because”, and comment is a free text citizens can enter for the policy issue.}

An attachment construct is used to link an opinion tag to point of interests (POIs) on a geographical map. Policy makers can define the type of POIs to which the opinion tag is attached and boundary, to restrict the scope of POIs. Tasks in a PMP are classified into opinion tasks and admin tasks. The main actors of an opinion task are citizens while the main actors of admin task are policy makers. It is assumed that a PMP has at least one opinion task, and one or more admin tasks. An opinion task has a field to represent policy issues to which citizens need to be engaged. A policy issue is described with multiple attributes including title, short description, long description, duration (activated date and closed date), opinion constraints, and display constraints. It also contains fields to specify what kind of opinions need to be collected and how. The duration of a policy issue may sometimes be dependent on the number of citizens or even the ratio of citizen groups that participated in the task. To handle the situations, workflow model needs to allow policy makers to define rules that constraint the duration of opinion collection. Citizen opinion is classified into one of voting, reporting, suggestion, and arguing. If an opinion task is aimed to allow citizens to cast their votes, then the task has an additional field that contains voting options. Also, the task has a field that provides citizens with voting guidance statements. For an opinion task that allows citizens free text opinion, mixture of two or more categories is also allowed. For example, policy makers may ask citizens to cast their votes among alternative options and provide reasons for the casting in plain text. Finally, POIM provides type information of POI instances on geographical maps. The ontology defined in a POIM is used in the transition rules for context reasoning based on the current location of a user and any POIs near the location. Each POI object is classified into predefined categories and described with a geographical coordinates for the ease context reasoning.

\[ POL\_TYPE = <\text{name, is\_a}\> \text{ where name is the name of a POI type and is\_a represents super type of the POI type. Every POI type should have one super type and the root type is “POI”}. \]

In PMWF, rules are specified in two sections: conditions and action. Conditions section is used to specify constraints that are associated with each other via AND relationships. Actions section of a rule is used to specify actions necessary to control a PMWF instance. PMWF model defines policy PMWF specific predicates and functions for easy specification of rules for PMWF models. The list of predicates is extensible according to new requirements from added PMWF models. Table 1 shows the specification language for PMWF. A PMP model specification starts with ‘pmp’ tag. Within a ‘pmp’ tag there are four sub level tags: ‘reldecrees’, ‘tasks’, ‘transits’, and ‘roles’. Each tag represents a composite construct which can have multiple instances. For example, ‘tasks’ tag should have at least
two tasks to be defined. ‘Transits’ and ‘roles’ tags require at least one transit and role construct respectively. ‘Reldecrees’ tag may not have any relevant decree construct. Relevant decrees provide citizens with contextual information about why a PMP is initiated and what impacts it has. Therefore,
a reldecree tag contains a text value. Each task construct is specified with task name, type and role. One of the task types are group task which require more than two actors to be involved in.

Role tag is used to define all the roles involved in the process and includes rules to identify who are eligible for the execution of a task. Form tag is used to define structure of a form which is shared by roles of the process. “Access” attributes indicates the access right of the role (write or read).

Finally, “opinion-tag” is used to define what policy issue is published to citizens for their opinion. This is the link between policy makers and citizens and contains information on policy issues in relation with the PMP and defines how citizens can respond to the issue like opinion type and any restrictions on who can write or read the policy issue.

POIM is used to classify POIs on geographical map into pre-defined types which are attached to policy issues of PMP. The categories defined in the POIM are referred by PMWF client program to identify any POIs near a user location to identify a list of policy issues to be shown to the user. The root type of POIM is “POI” and all POI types inherit from POI type in a POIM. Policy makers can define a hierarchy of POI types using “is_a” relationship between two POI types. Once a type hierarchy of POIs are defined, all POI instances on a geographical map are associated with one or more types of POI in a POIM.

4 Example

This section applies the major modelling constructs of the proposed PMWF model to real world policy making processes to show the practicality of the model. Some of the exemplary specifications are described to illustrate how the PMWF model can represent real world policy making processes in two countries: UK and Turkey.

4.1 Urban Planning: Land Use PMP

The exemplary PMP for the specification of the PMWF language is the urban planning for land use process. The goal of the process is to update and improve land use planning processes within the town planning department of a municipality in the UK. The process is triggered as part of a change from having a cycle of revisiting comprehensive plan every ten years to a process where parts of the plan are revisited on an “as required” basis. The overall process is started by central government prescribing the change in methods for land use planning. The land use planning process has 12 tasks but only few important ones are described in this paper to capture the idea of PMP in UK. Chief executive with chief planning officer first plans out the workload to be distributed among the planning team. Then all the chief officers along with the politicians prepare a list of issues and alternative options that need to be taken into account, and forwards it to the planning leader. These options are put forward for public participation and preferred options narrates which ones are acceptable and which needs further analysis. The chief executive then makes arrangements for the preparation of the Local Development Framework which is required by the council to prepare an Annual Monitoring Report (AMR). The planning team leader then prepares Development Plan Document (DPD) and makes amendments to sustainability report thus producing final report. Next, the chief executive submits final DPD and sustainability report to Central Government Secretary of State. The government then provides the final feedback after the review of DPD.

The process has 12 tasks therefore 12 task tags. However, this section shows an example for each tag to show how the modelling constructs can be specified by PMWF specification language. Table 2 shows sample specification of two tasks, two roles (residents and opinion-leaders), and a transition from the second to the third task. The task “prepare initial sustainability appraisal report” is defined as a policy maker task (PM Task) and the owner of the task is “chief town planning officer”. The input form is “Analysis report on land use policies” which is the output of the previous task. The output form of the task is “Draft changes on land use policies” which is produced by the chief town planning officer after consultation with experts and regulations. The task does not have a post-condition that automatically determines the completion of the task.
Table 2: Urban planning for land use policy process specifications.

Therefore, the chief town planning officer is supposed to change the status of the task manually when s/he produces the output form. Once the output form is submitted by the planning officer, then the transition “t1” will transfer the workflow control to the next task “Collect public feedback”. The next task is specified as “citizen task” which means that the task is allocated to citizens. Two roles are involved in the task: residents and opinion-leaders. The “residents” and “opinion-leaders” roles have a filtering rule to decide who can participate to the task respectively. Finally, the task has a post condition that changes the status of the task into “completed” when at least 1,000 residents and 100 opinion-leaders participated to the task. The conditions have been specified via participants_more_than predicate.

participants_more_than ("residents", 1000); and
participants_more_than ("opinion-leader", 100);
The predicate participants_more_than has also two arguments. The first one represents the role of participants and the second one the number of participants. As a result, the above predicates will return ‘true’ when the number of residents who participated to the task is more than 1000 and when the number of opinion-leader who participated to the task is more than 100 respectively.

### 4.2 New library building process

The second example of policy making process is more operational process which implements a policy for building a new library in Turkey. The goal of the process is to open a library for a year in the performance program and to put into service library buildings according to the discretion of the management. The process is usually triggered by the requests from residential citizens therefore citizens are playing an important role in the beginning of the process. In this scenario, white desk unit receives the request to open a new library from the citizen in the form of citizen demand which is accepted as registration request form. Library department evaluates the request demand and place it in the strategic plan of objectives. Strategic plan work group then develops strategic goals and objectives. The district that needs a new library is decided after the draft Strategic Plan is discussed and approved in assembly by consensus. Once the approval is received by the library department, a bid is carried out for the construction of the building. After this, the construction starts and the library department arrange books for the new library. Next, the library department arranges employments by the directorate’s approval and the library is inaugurated by the upper management. After the inauguration the new library is ready to service.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>&lt;condition id=&quot;c1&quot;&gt; &lt;predicate&gt; &lt; pname=&quot;in_days_after&quot;/&gt; &lt;parg order=1 value=&quot;300&quot;/&gt; &lt;parg order=2 value=taskId_ACTIVATED&gt; &lt;/predicate&gt; &lt;/condition&gt; &lt;condition id=&quot;c2&quot;&gt; &lt;predicate&gt; &lt; pname=&quot;participants_more_than&quot;/&gt; &lt;parg order=1 value=&quot;residents&quot;/&gt; &lt;parg order=2 value=100&gt; &lt;/predicate&gt; &lt;/condition&gt; &lt;/conditions&gt;</td>
</tr>
<tr>
<td>Role resolution</td>
<td>&lt;role name=&quot;Head Teacher&quot;/&gt; &lt;rule&gt; &lt;conditions&gt; &lt;condition&gt; &lt;predicate&gt; &lt; name=&quot;has_public_position&quot;/&gt; &lt;arg order=1 value=&quot;pendik&quot;/&gt; &lt;arg order=2 value=Head_Teacher&quot;/&gt; &lt;arg order=2 value=?/&gt; &lt;/predicate&gt; &lt;/condition&gt; &lt;/conditions&gt; &lt;/rule&gt;</td>
</tr>
</tbody>
</table>

Table 3: New library building process specification

The example specification shows only a task and two role descriptions as the other construct specifications are similar to the previous example. It is important to note that the task has two rules representing post conditions.

- in_days_after (300, TASK_ACTIVATED); and
- participants_more_than ("residents", 100);

The first argument represent the length of the duration and the second one the starting point of counting the duration. In this case, the predicate will return ‘true’ when it is more than 300 days after the task is activated.

In PMWF language, two or more rules within one task or role construct are linked each other with “OR” relationship. That is, the task “collect citizen requests for new library” is completed (closed) 300 days after the task is activated or there are more than 100 residents who request a new library in the municipality. The role resolution rules in the role construct have been defined using a predicate which would take following form in a logic language.
5 Discussion and conclusion

After a discussion of different extant models in literature, policy making workflow framework has been developed, which combines policy making process model and point of interest model. The PMWF modelling framework has been designed to link policy making processes with citizens’ everyday life context and POIs so that citizens could be involved in the policy making processes in the middle of their everyday life. PMPM is used to define policy making processes, and POIM to define hierarchies of POIs on a geographical map. The two sub models are inter-linked with each other to allow citizens to identify any policy issues and processes based on their current context (location and other contexts). Subsequently, two important constructs have been integrated in the PMWF, ‘opinion tag’ construct for collecting feedback from citizens and services tracking options, and ‘role resolution’ for qualifying citizen’s with varied roles for appropriate e-participation.

In this paper, PMWF framework is applied to the exemplary sample workflow of two policy making processes in Turkey and UK. The ability of PMWF to represent, when applied to the two examples provides evidence of feasibility and validity of the proposed framework. Also, examining the impact of workflow technology on policy formulation in different countries can provide for generality of the framework. This would contribute to the developing theory of information systems management in public sector and enhance the opportunities for good quality policy formulation. Additionally, it demonstrates the advantage of automation in location based PMP with large number of users. It enables to map roles effectively with respect to citizen context in the complex workflow of PMP. It is also appropriate to represent exceptional rules that are applied to activities in the workflow system. PMP consists of all the citizens with varied roles of a student, Politian, professional etc. PMWF is applicable for modelling the business rules that are changing according to the user type. Conventional workflow systems mandate participants to check allocated task by workflow engines which will create resistance to e-participation in PMP. PMWF provides with the optimal solution of penetrating into citizen’s lives to get their feedback for policy formulation without projecting a sense of enforcement, but as a natural part of their daily routine. Also, existing workflow models fully automate business processes, PMWF allows prioritising of tasks and execute accordingly. Lastly, ability to be applied to ubiquitous business process is the main advantage of the PMWF.

The model verification techniques will further increase the feasibility of framework by testing for redundancy, inconsistency and incompleteness of specifications. Adoption of context aware computing (Abowd et al 2002), will enable policy making processes to be executed in the middle of citizens’ every-day life. The technology provides a WfMS engine with an opportunity to identify the best time to notify citizens, with any relevant policy issues, in the most relevant context. Also, an opinion mining engine need to be integrated into the workflow, so the progress of a task that collects citizen’s opinion, requires sophisticated analysis of large volume of citizens’ text opinion and an opinion mining engine can automate this task.

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