

SMART Public Enterprises using Semantic Knowledge Management

ManujDarbari, Hasan Ahmed, Purna Kam Singh

Abstract: *The paper highlights the issue of Administrative style using New Administrative Management by merging Psychological Style and IT infrastructure support. The paper proposes an elaborated Transformation Process using Semantic Knowledge management through Ontology. The tool used in the transformation process is DROOL.*

Keywords : OWL, New Public Administration.

I. INTRODUCTION

Now-days role of Public Administration in Society has increased by manifolds, unlike in older days where classical methods of Administration was sufficient to manage any Public enterprise. With the development of e-Governance skill set to manage Public Administration. Till such date Christopher Hood's codified the Public Management in 1991 a radical change has been seen in Public policy implementation and Management. The concept of Hood's was mainly focused to New Public Management (NPM). The traditional Public Management has been replaced by Public Sector Management, the main focus was to upgrade the existing public services and improve its Quality. Balk (1996) also emphasized on reducing the expenditure of public sector enterprises, by implementation of effective public policies. Recent development by Bovaird (2001) emphasized on linking of Information, Communication Technology for service delivery in public domain, such that its should percolate downward to the local level.

Since the budget was derived by World Bank support, the implementation become essential and under strict guideline of World Bank using effective Public Administration policy of the Government which makes the system more transparent and works on public-private partnership framework.

The direction of Public Administration lies in providing classical administration and administration relating to developing countries; which uses modern technology and tools. The basic feature of Public Administration consists of public task to be done and public service to be attained.

There is an extensive need to inculcate the application of Information Technology and data modeling in all functions and activities. A well established communication network is needed which percolates well in the downward direction.

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There is a strong bonding between Civil Administration and Human Resources, in India each civil servant is categorized with some legal provisions. There is probably very huge gap in general orientation for managerial positions and strategic policy decision making.

Although there is extensive training in the era of job admittance yet there are various holes where training relating to state administration and information technology needs to be developed, secondly the coordination with other departments is still lacking.

The proper co-ordination between the elected members and the Government servants is still lacking till date and these a major reform, with the main aim of benefitting the people. In this paper we propose to develop a framework to implement perfect democratization to highly effectiveness of the model ultimately focusing on high recommendable to the public. This model will be encompassing current legal framework, Psychological factors and knowledge creation and information and communication technologies.

An integration of Knowledge Management and Modern Public Management plays a crucial role in dealing with effective management of Public enterprises as well as Government Agencies. Besides the above integration of Knowledge Management, the factors of leadership should also be taken into account. In this paper we have tried to combine the Behavioral Models of Leadership style with Knowledge Management for better Public Management.

II. LITERATURE SURVEY

A. Submission of the paper

Many factors contribute to recent changes in business emphasis including an increasingly sophisticated and demanding market place, deeper acumens into business functions, and greater comprehensiveness of knowledge demanding work and ability of how people think, learn, and use knowledge. These come under cognitive sciences. Contributors to the dramatic change in cognitive sciences can be attributed to Brown & Duguid 2000, Damasio 1994 and 1999, Halpern 1989, Nonaka & Takeuchi 1995, Klein 1998, Schön 1983, Wiig 1993. Knowledge management (KM) has merged to bring approaches for creating and growing and uplifting intellectual capital (IC) into the business equation (Allee 1998, Böhme & Stehr 1986, Reich 1991, and Wiig 1994 and 1997). IT is used extensively to support KM and the semantic front allows for the domain knowledge expansion in multiple dimensions. Knowledge in the stringent (for rule inference or reasoning) yet flexible (for merging with other knowledge

bases) form of ontology provides best of the tools to manage information flow and the overall functioning of the public administration system along with the terms, relationships and the vocabulary.

Within knowledge management (KM), the public sector is an evolving and specific research context. According to Edge (2005, p. 45) KM “has the potential to influence greatly and improve the public sector renewal processes”. Within the public sector KM “is a powerful enabler in the current drive for increased efficiency in all areas” (Mcadam and Reid, 2000, p. 328). However, Edge (2005, p. 45) argues that developing a KM culture within the public sector is more challenging than in the private sector. Amayah (2013, p. 456) supports this argument outlining “organizational goals in public organizations are typically more difficult to measure and more conflicting than in private organizations, and they are affected differently by political influences”. Additionally, the public sector has specific labour divisions that are a disincentive to knowledge sharing and “this situation makes knowledge delivery in the public sector more difficult than that in the private sector” (Gau, 2011, p. 2).

‘New Public Management has variously been defined as a vision, an ideology or (more prosaically) a bundle of particular management approaches and techniques (many of them borrowed from the private, for-profit sector)’ (Pollitt, 1994:1). NPM is managerial thought (Ferlie et al., 1996:9) or based on ideas in the private sector and brought into the public sector (Hood, 1991, 1995). Many of these reforms have similarities with the modernization component of good governance (Grindle, 2004). Van Thiel et al (2007) characterizes NPM as hybrid. UK played an important role in developing the concept of New Public Management (NPM) and can claim to have been its ‘birth place’ (McLaughlin et al, 2002). Indeed, the seminal paper which coined the term NPM was the product of the UK experience (Hood, 1991). The work done by Osborne & Gaebler (1992) also conferred appreciably in the detailing of the concept.

III. PROBLEM DEFINITION & PROPOSED SOLUTION

Public Administration concept in India of firstly introduced by Wilson (1887) in his book "The Study of Public Administration". Later on Public Administration became the backbone of Political scenario of any country. The present status reflects the Public International Law which is percolated down to the local Public Administration in the form of a Treaty. This treaty then becomes a law and it has to follow with International levels. Previously Public Administration was more focused to the local level of any nation, but now with the intervention of International bodies like IMF and World Bank, the role play of a Public Administration has been changed considerably. Nowadays there is considerable requirement of Global democratic Public Administration which can support cross-national

support, with high degree of Technology usage and Knowledge capturing. Knowledge capturing plays an important role in streaming the information which forms as an input to the administrator these knowledge can be categorized as Tactical and Routine delegation.

The New Public Administration face the challenge of increase amount of data which is generated by the (i) Secretariat (ii) Minister's Office and (iii) Government functioning. The basic framework involves Knowledge Management for competitive advantage.

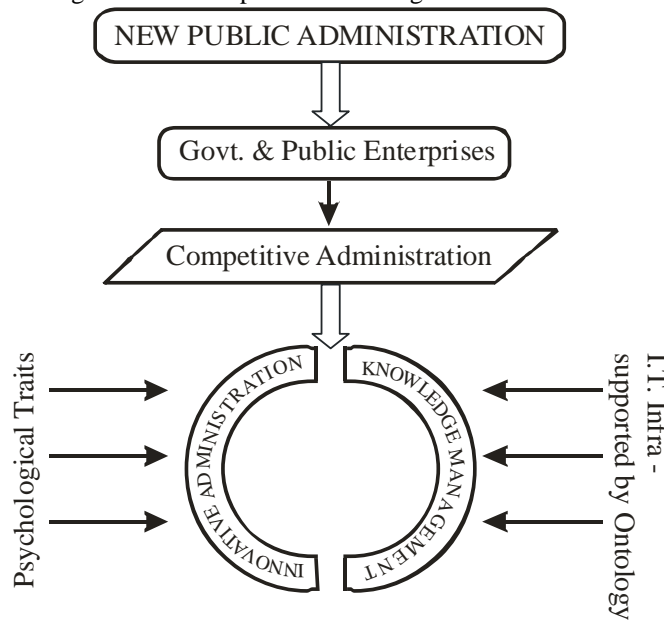


Fig. 1. Downward Flow Model

New Public Administration requires more effective efficient and Meaningful delivery of Authoritative decision. Not only that a constant vigil on work in progress is also desired.

The basic idea is how e-Government along with latest Psychological traits benefit in Public Administration. The focus of this paper is to develop a strong bridge between Knowledge Management Psychological traits and New Public Administration.

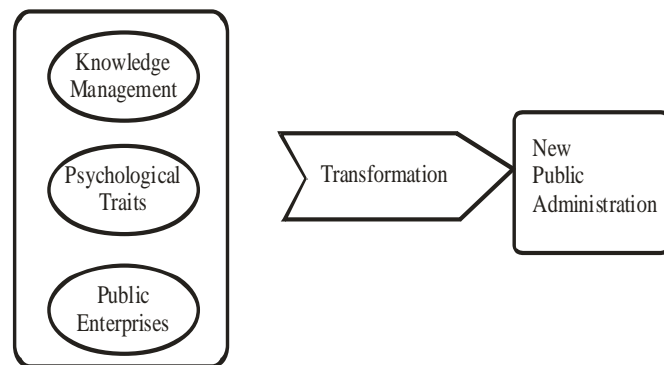


Fig. 2. Transformation Process

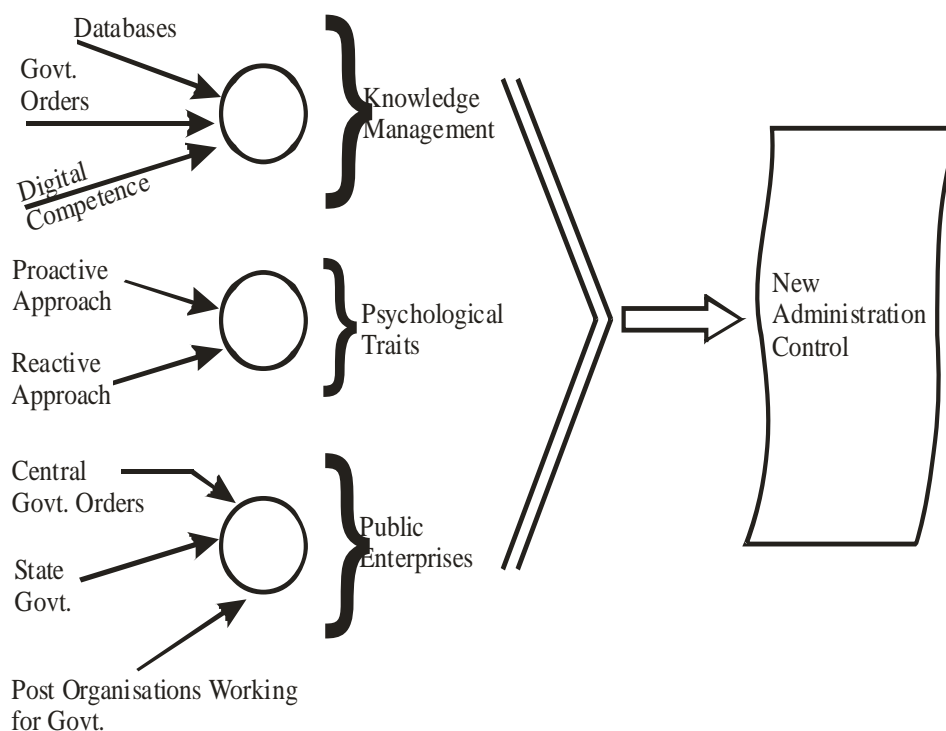


Fig. 3. Elaborated Transformation Process

The Role of Administrator as described in figure 2 and 3 is more focused on good learning and imbibing cultural values of retrieved of previous knowledge and establishing hierarchy of Analytical information.

IV. NEW PUBLIC ADMINISTRATION / MANAGEMENT

Working of DROOLS Reasoner

The reasoner sends query to desired ontological knowledge base represented by Protégé Ontology and the result aids the respective public administration tasks:

1. Decision Support for Administration and Management
2. Public services to citizens

SPARQL is selected as the query language which after query execution returns the results that can support decision making for public administrators to carry out their tactical or routine tasks or the results that suggest public services that match the selected user profile.

The semantic discovery of the public services that match the specific user profile is a two-step process. The first step is to find all the sub-classes of User_Profile Class whose individual objects match the eligibility of the public service. In the disabled user case these are the individuals of the Health_Status class. The user itself is the object of the

User_Profile Class. We assume that such an individual is 'John Sonmez'.

The SPARQL query to extract a disabled user is as given below:

```
PREFIX NPA: <http://localhost/PA_ONT #>
PREFIX rdf: http://www.w3.org/1999/02/22-rdf-syntax-ns#
SELECT ?Precondition
WHERE
{
  ?Precondition NPA:
  Pre_Cond_For_Public_ServiceNPA:Disabled.
}
```

After the desired user is returned by the query then the task of assigning public service to him is done through another SPARQL query given below:

```
PREFIX NPA: < http://localhost/Profile2service.owl #> •
PREFIX rdf: http://www.w3.org/1999/02/22-rdf-syntax-ns#
SELECT ?Service
WHERE
{
  ?Service rdf:type NPA:PA_Service_Domain.
  ?Service NPA:hasPublicServiceNPA:Disabled.
}
```

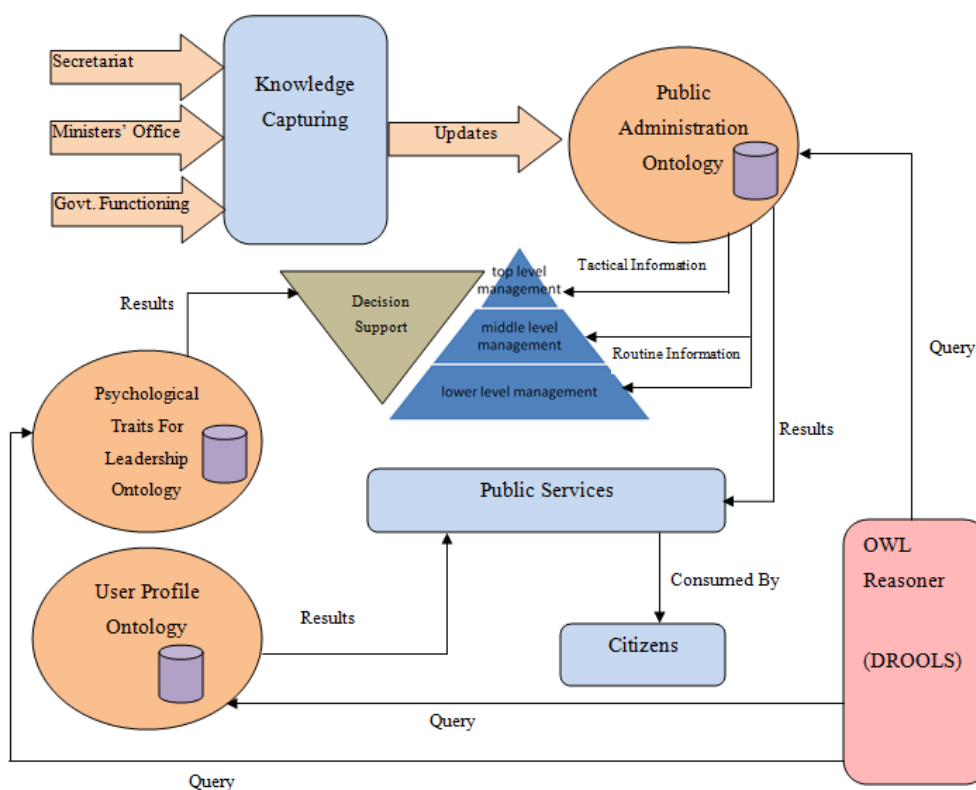


Fig. 4 New Public Administration employing Semantic Knowledge through Ontologies

In the above Proposed Public Administration System, the author has developed three ontologies namely, Psychological Traits, User_Profile and Public_Administration.

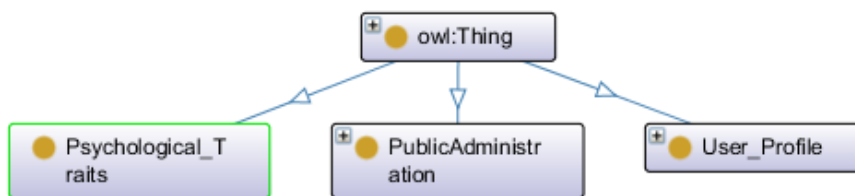


Fig. 5 Top Level Ontological view comprising three main ontology:

The top level ontological graph is shown in figure 5.

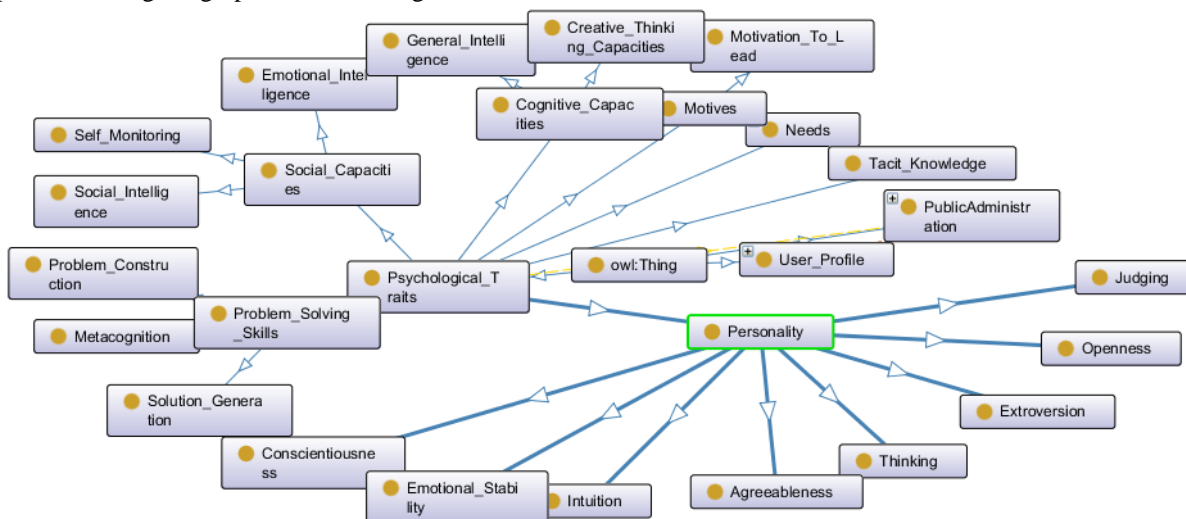


Fig. 6 Psychological Traits Ontology shown in ONTO Graph

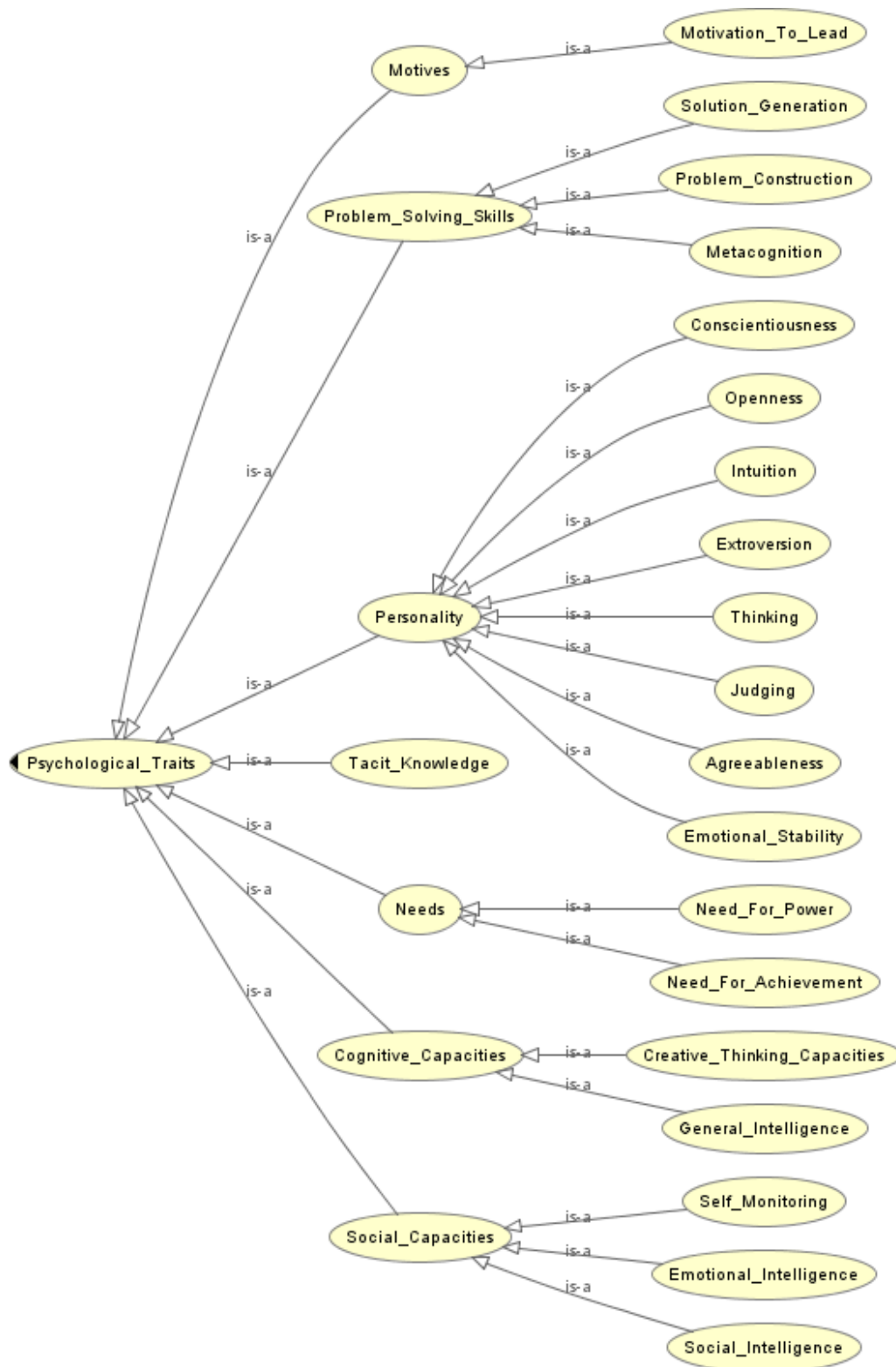


Fig. 7 OWL Viz Ontology map

The top level ontological graph is shown in figure 2.

A. Psychological Traits

Personality assessments and Psychological traits can be used as a valuable tool during the evaluation of public officials under consideration for recruitment, appointment, and promotion. Matching the personalities of potential candidates to positions requiring comparable qualifications has important organizational, personnel, and financial

implications. Our research also suggests that decision-making and personality should also account for social, cultural, and organizational differences in their applications. The ONTO Graph and OWL Viz map are shown in Fig. 6 and Fig. 7.

B. Public Administration Ontology

Fig. 8and

The authors define a generic domain model for public administration. It defines common aspects and generic features of the domain that constitute the ontology shown in

Fig. 9.

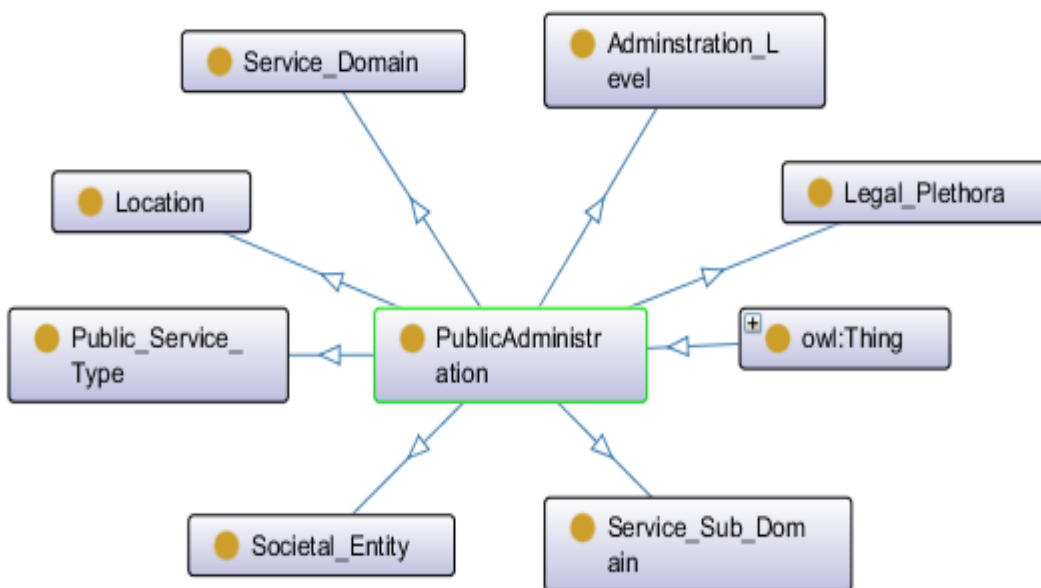


Fig. 8 Public Administration Ontology shown in ONTO Graph

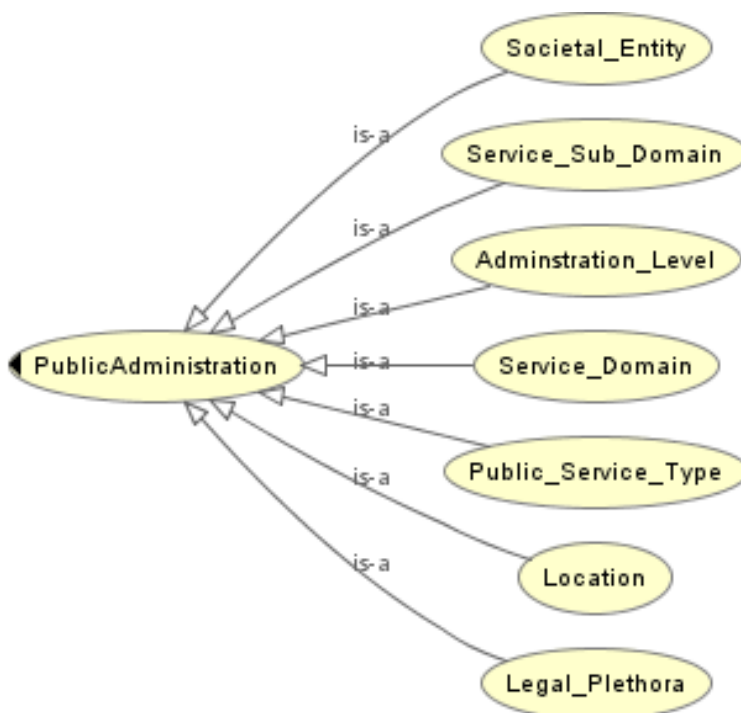


Fig. 9 Public Administration Ontology shown in OWL Viz map

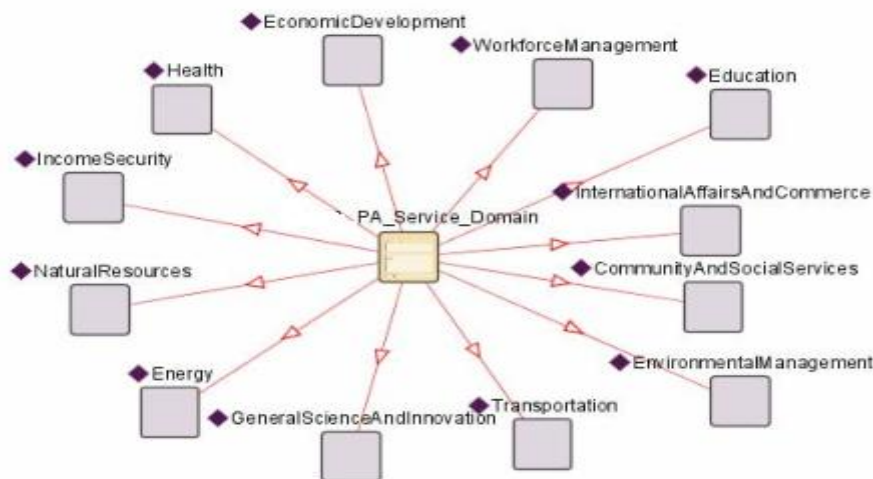


Fig. 10 PA Services Categorization
 The categorization of PA services is given below in figure 10

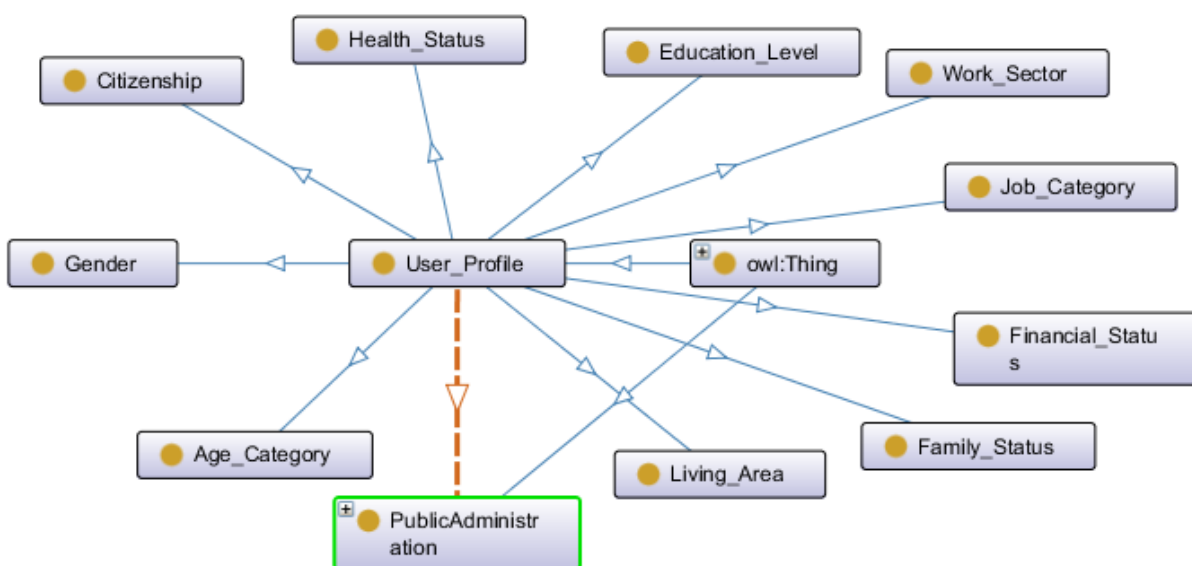


Fig. 11 User Profile Ontology shown in ONTO Graph

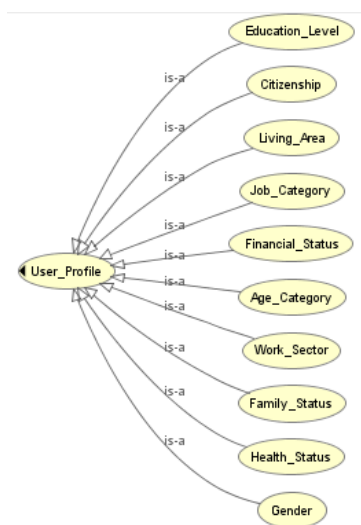


Fig. 12 User Profile Ontology shown in OWL Viz

C. User_Profile Ontology

This ontology represents the conceptualization of user profiles in order to assign a public service if a user is suitable to be allotted that service. The profile details of the user are semantically matched with the profile-public_service mapping and the user is found to be eligible or non-eligible for a service. For example, in order to avail the Pan Card Issuance Service, the user has to be an adult. The USER Profile Ontology is depicted in Fig. 11 and Fig. 11 and

Fig. 12 User Profile Ontology shown in OWL Viz. Fig. 13 shown the User_Profile class and its sub-classes. The individuals or the objects of these sub-classes are shown with the diamond symbol.

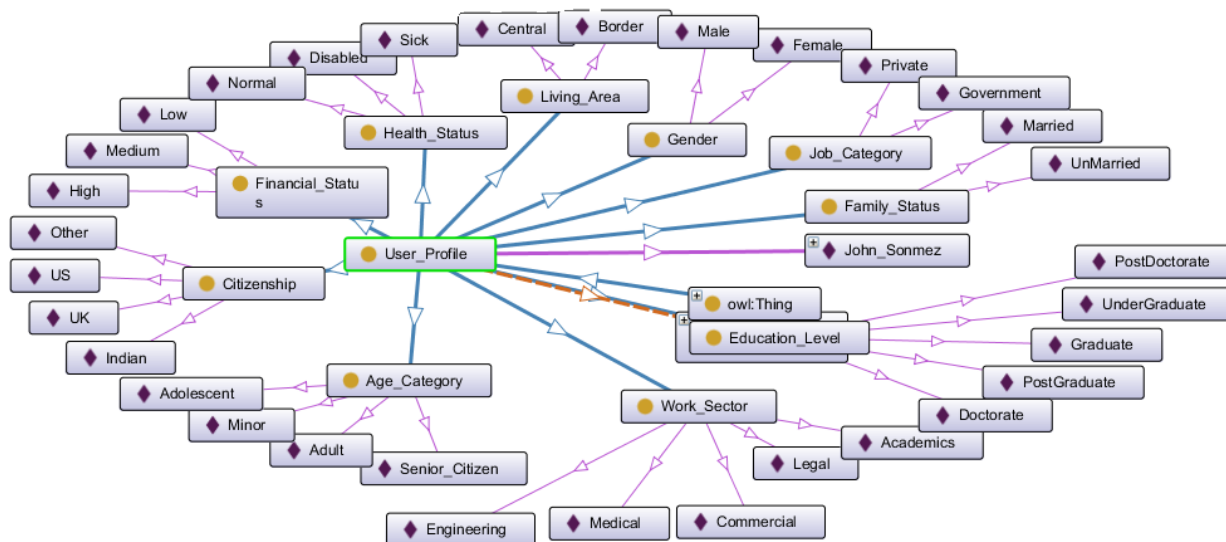


Fig. 13 User_Profile class, its sub-classes and their individuals or objects

User_Profile is a prerequisite to attain Public service. The User_Profile is linked with the Public_Administration by Pre_Cond_For_Public_Service property. The Psychological_Traits are a prerequisite for better Decision Making. The Psychological_Traits are linked with the Public_Administration by Pre_Condition_For_PA property. These links are shown in figure below:

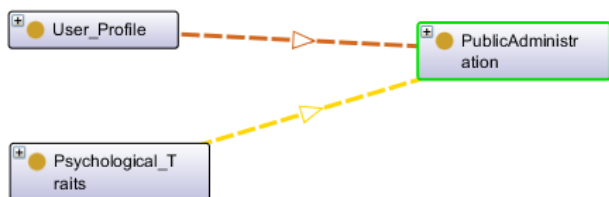


Fig. 14 Shows a Linking between User Profile and Psychological Traits.

V. CONCLUSION

In this paper the authors have presented an ontology for e-government public services. The ontology covers multiple aspects of services, including administrative responsibility and administrators’ / managers’ psychological traits befitting government positions. The ontologies also encompass involved documents, legislation and meta-data, formulating a semantically rich network of interrelated concepts. This network can be jointly developed by public administrations, subject to administrative authorization, and directly supports essential tasks of service provision, such as service composition, change management and service cataloguing. This ontology is complemented with active mechanisms, including rule processing engines like DROOLS that is used in this work, workflow enactment modules etc., to deliver value-added services e.g. invocation, coordination and data exchange between the constituent services within a service composition path. Future work will focus on the definition and management of temporal characteristics and mentalistic notions by using software agents, the creation of an integrated Multi-Agent platform that will fully manage the ontology and encompass mechanisms for provision of value added services. Integration with third-party information systems, such as legal databases for extracting legislation

information is already committed in this work, will be improvised by using advanced semantic web services. Constant updation and flourishing for the ontologies with each new concept added in tandem with the change in environmental domain is necessary for the system’s overall growth and sustainability.

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Manuj Darbari has published around 100 papers in reputed International Journals and Conferences ranging from IEEE, ACM and IET, he has twenty years of experience in teaching and research. He is Sr. Member of IEEE and IEI(India). He is also working as a consultant to various IT industries in the field of IT based Automation.,





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