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Digital Ecosystem through proposed Assembly Rules approach for Northeast India

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Abstract. The "digital" information and communication technologies constitute a fast growing proportion of GDP of both developed and under developed economy. ICTs have a great potential to deliver competitiveness in a sustainable manner. It constitutes itself as an industry, as well as provides a technological base for the complete business environment. So postponement of ICT access to underprivileged creates greater digital divide. This paper focuses on how ICT can be developed through the potential digital ecosystem of the region. This subsequently can create wealth, and reduce the income-divide among northeastern region in comparison with rest of Indian states. The northeastern states can emphasize its latent resources and capabilities of the local peoples in formulating strategy to achieve a sustainable competitive advantage.

Keywords: North Eastern Region (NER), Digital Ecosystem, ICT, Sustainable development.

1. Introduction

North Eastern Region of India (NER) is rich with natural resources for industrial development. Due to adjacent long international boundary, it seems security becomes the first priority for Government rather than economical development. The region is connected with rest of country through a very narrow passage at Siliguri that creates problems for accessibility and mobility of goods and services. All northeastern states are very low population density; with inadequate communication infrastructure clubbed up with media created hype of terrorism, which prohibit the private players to consider this region as a financially lucrative alternative [16]. As a result of which often the eight sister's (eight states of NER is referred as eight sisters) deficit budget is compensated through centre. The greatest need for such economies is instant access to virtual institutions to provide education, health care, banking, agricultural advice, and so forth. The region is composed of many tribes, and sub tribes, each with different sets of beliefs. Peoples over here often depend on nature for their daily livelihood. Hence the economical development cannot ignore the social, cultural and environmental factors. It has been observed that the under privileged regions are able to 'leapfrog' over their more economical developed competitors through ICT in a sustainable manner [6, 9]. Moreover, unlike other sectors ICT does not require huge investment for physical infrastructure such as roads, ports, etc. Rather qualitative power, telephone, and Internet connectivity are the major infrastructure ingredients. And the key success factor for ICT is human resource. Though the region is adequate with resources for this sector, the peoples often migrate towards many IT hubs of the country for employment.

The objective of the paper is to focus upon the prospects of proposed digital ecosystem for NER through the usage of ontology. For which the research work is mainly carried out through the secondary data of various earlier published journals, chapters of books, and proceedings of conferences. Articles of newspapers and periodicals are used for recent data of NER. The primary data constitutes interactions with the various official personnel of power sectors (both government and private), and students of NERIST. The consolidated data analysis and validation is done through observation, and personal experiences of authors.

2. Assembly rules in Digital Ecosystem

Digital Ecosystem is a result of the natural existence of Business Ecosystem, along with the evolution of business network and information technology. The objective of digital ecosystems is to bring efficiency of

ecosystem comprised of species and an ecosystem environment. There are three basic types of species – biological species, economic species and digital species [3, 5]. The succession of eco system determines initial established pioneering species, and more complex species evolved in the later phases. Biologists sometimes call the rules governing such relationships "assembly rules," that is, the rules affecting the assembly, in sequence and over time, of ecosystems. Similarly "disassembly rules" is applicable to those species who cannot adapt to the evolving ecosystem. Digital ecosystem also follows the same rules.

3. Digital Ecosystem of NER

The proposed Digital Ecosystem of NER is comprised of three basic types of species – i) biological species (Human Resources of the Region), ii) economic species (Proposed Hydro Electric projects) and iii) digital species (Computer Network). The digital ecosystems of NER are being presented in the ontology form as suggested by Dong, and et al.in Fig1, 2 &3 for all the three species.

3.1. Biological Species

There is a general misconception about the Northeast in many parts of India. "Peoples are culture-less tribal, head-hunters, that they eat wild animals". S. Gurumanickam, an Assistant Engineer by profession working for DD Kendra has nicely elaborated his ten-year stay at Mizoram in a national daily newspaper. He has explained that though there are certain differences, they have, with respect towards social dynamics as compared to rest of country. Still they practice honesty and truthfulness as a trait. They honor their word. Crime is unheard of [17]. North East India is one of the most diverse, heterogeneous and socially complex regions in the entire world. May be due to this the thousands of educated girls from NER, who come to work in the IT and other sectors across the country, reportedly face racial discrimination and sexual assault [20]. In August 2012 due to a mobile rumor, around 30,000 number of north east youths had fled away from a single city Bangalore [18]. Through this number we can imagine the region's work force working in many parts of the country.

The favorable manpower resource can develop their hometown into a mini IT hub. Nearly 70% accounts for the labor costs for the ICT sector. As per Economic Survey 2011-12, the literacy rate of NER is 79.64% as compared to national average of 74.04%. Arunachal Pradesh is the only state that has a literacy rate (66.95%) lowers than the national average. In all states, excluding Assam, and Tripura, there is no common language for communication among themselves. For instance, there are at least 10 major tribes in Nagaland. None speaks the dialect of other tribe. So over the years a common dialect, Nagamese, has evolved. It is a mixture of Assamese, Bengali, Oriya and English. It does not have a script. The official language is English, which is spoken by almost all Nagas [21]. Similarly in Mizoram, though they have a script developed by Christian missionaries, but it is English with mizo pronunciation. As most of the states do not have their own scripts, hence they rely only on English language for the education purpose. In a way the region produces best suitable human resources for ICT. It is not mere manpower, rather qualitative technical manpower. Now union government's initiative to start National Institute of Technology (NIT), Central University in each and every state, has significantly encouraged the manpower talent at par with national level in this region. Two major players of the national educational map IIT Guwahati, along with IIM Shillong are also engaged in continual educational, research, and consultancy development of the region.

Youths of NER express their feelings through various social network web sites, blogs, etc. Localized IT hub can be a win-win situation for both local entrepreneurs and local youths. The local youths will be benefited by employment at their home town, as well as the local entrepreneur will get cost effective manpower. Service quality has to be maintained as per international clients; subsequently it will give livelihood to many unemployed youths. They can also have another option to lead healthy financial life with self-esteem in their respective states [APPENDIX A].

3.2. Economic Species

As per Annual Report 2011-12 of ministry of power, there is total installed capacity of 57672.5 MW in the NER, out of which only Arunachal Pradesh state accounts for 46977.5 MW. To furnish the output there are total 157 numbers of schemes floated by central (13), private (114), and state sectors (30). So far The Ministry of Environment and Forests (MoEF) has granted pre-construction (scoping) clearances to over 50 projects under the EIA notification 2006. Final environmental clearance has been given to 13 projects. Arunachal will get 12 per cent free power from each project. The State government collected revenue in terms of processing fee and upfront premium to the tune of Rs. 1,320 crore (as on September 30, 2010) from the allottee owner-developers [12]. Perennial rainfall along with the mountainous region has lots of potentiality to tap this. Due to lower population density, the major problem of rehabilitation in the hydro electricity project can also be sorted out. Already not only government, but also many private sectors are in the different stages of electricity generation are operating in various states of north east. Chief Minister of Arunachal had meetings with the Indo-Canada Chamber of Commerce and the Consulate General of India to bring substantial private investments for the power sector [22].

The sustainable development can only be possible if and only if the people's verdict is given utmost priority. For example the 2000MW Subansiri Lower Hydro Electric Project hit a major barrier with around 18,000 people had taken oath in an anti-dam rally to stop the dam construction on Subansiri River. Krishak Mukti Sangram Samiti (KMSS), Asom Jatiyatabadi Yuva Chatra Parishad (AJYCP), Takam Mising Porin Kebang (TMPK) and other prominent NGOs have called up this rally at Chaulkhowa in Lakhimpur district of Assam. Prominent leader Medha Patkar also supported this movement [10]. The economy and environment must move along for sustainable development. The co-operation among different states of NER in this regard can definitely give a better holistic result. So the need of the hour is to undertake confidence build up through the public hearing before starting of the project, robust technology to with stand the worst combination of forces, seismic study by reputed research organization, along with consultation with environmentalist to replenish the environment may give proper long term out come. For example National major NHPC had undertaken various steps for its upcoming Dibang multipurpose project. The population density of the state is less than 20 per sq kilometer; to compensate the employee force the upcoming hydro projects will recruit outsiders in huge number. In the process the peoples of the region are apprehensive to become minority in their own locality. So during the public hearing the NHPC officials informed that project colonies for its employees and labors will be established far from the Roing Township and also assured that they will not move out and interfere with the activities of local people. It was also informed that the outside labors under Dibang multipurpose project will not be allowed to participate in voting process in the twin district [19].

The NER's per capita consumption of electricity is 220 KWH as compared 615 KWH (in 2005-06) of national average. As NER cannot absorb all the power so power has to be taken out from the region. Apart from the problems associated with the laying of transmission lines through difficult terrain, there is also the serious issue of having an adequate numbers of lines to transmit power from this region to other parts of the country through Siliguri is so small and congested that evacuation of power is proving to be a major challenge. This area, which is commonly referred to as "Chicken's Neck", is a very narrow passage [8]. Through the proposed the localized IT hub can be treated as a fourth pillar to power generator, distributor, and transmitter. The renewable green energy can definitely boost up revenue generation for the sector, subject to fulfilling the norms of Ministry of Environment and Forestry, and the interest of local people [APPENDIX-B].

3.3. Digital Species and Assembly rules

At present there are some of the local entrepreneurs have undertaken lead to start up some of the ICT Company.BohnimanSystem(www.bohniman.com),Helix(www.enterhelix.com),RegleInfotech(www.regleinfotech.com), Sangeeta Communications Private Limited (www.sangitagroup.com), Zaloni(www.zaloni.com) are some of the IT/ITES companies started in early 2000 in Guwahati by local entrepreneur. Many of them were ex-employees of leading IT companies. The major infrastructure problem of ICTf or NER is Internet

connectivity. Presently the Internet connectivity is through the congested siliguri route from Kolkata. As per recent development Bharat Sanchar Nigam Limited (BSNL) has considered broadband connection for the region through neighboring Bangladesh. As per the officials of BSNL there is already an existing optical international fiber link between Kolkata and Dhaka. The distance from Tripura's capital is just 8 km from the international border of Dhaka. Though at present various private players are operating in NER but it cannot be considered as a qualitative one for ICT sector [11]. The digital species will be benefited by both economic species for getting power supply, as well as qualitative manpower as representative of biological species. The region can be developed into an IT hub provided the successful implementation of Internet connectivity, as well as hydropower as a reality [APPENDIX C].

4. Assembly rules in Digital ecosystem of NER

There is a positive symbiotic relationship being observed among all three species of digital ecosystem of NER. Amongst the three, the Biological species in the NER is supposed to be the primitive and established. The Economical species behavior seems to bring some positive vibes in the digital ecosystem for the NER. However the relationship must look beyond the traditional zero sum game, in order to allow flourishing the new digital species: following the assembly rules. The new digital species will bring socio-economic development for the biological species through employment generation for the youths of the region. Biological species will also provide the Human resource in a most economic way. Similarly the distribution and transmission problem of economic species can also be sorted out through the digital species.

5. Conclusion

The proposed digital ecosystem is economic, environmentally, common man friendly. Development of ICT in the region can also encourage for better infrastructure in respect to road, and port. Simultaneously other supporting industries will also be attracted to fulfill the demand supply equation. The function of digital ecosystem is associated with different facets such as service creation, service execution and service optimization [5]. For an instance, an local IT company has formulated the problem of Assam State Transport Corporation (ASTC), now they follow a B2B model, which has created employment opportunity for 150 educated youths, as well as consumers have got easier access to bus tickets through PCOs, and cyber cafes[14]. Such type of projects will act as catalyst for social equalizer fulfilling all three facets of digital ecosystem. In long run, the region will be competent enough to convert the look east dream into reality. All these need a proactive approach from the people of the region to take lead to be employment provider rather than becoming mere employment seeker through the ICT industry. The financial institutions of the region should come forward to introduce innovative supporting tools. The state governments along with the centre must also encourage through tax holidays for entrepreneurs of this sector. Digital Ecosystem will work multiple roles of generation, operation and long-term maintenance of sustainable development of the NER.

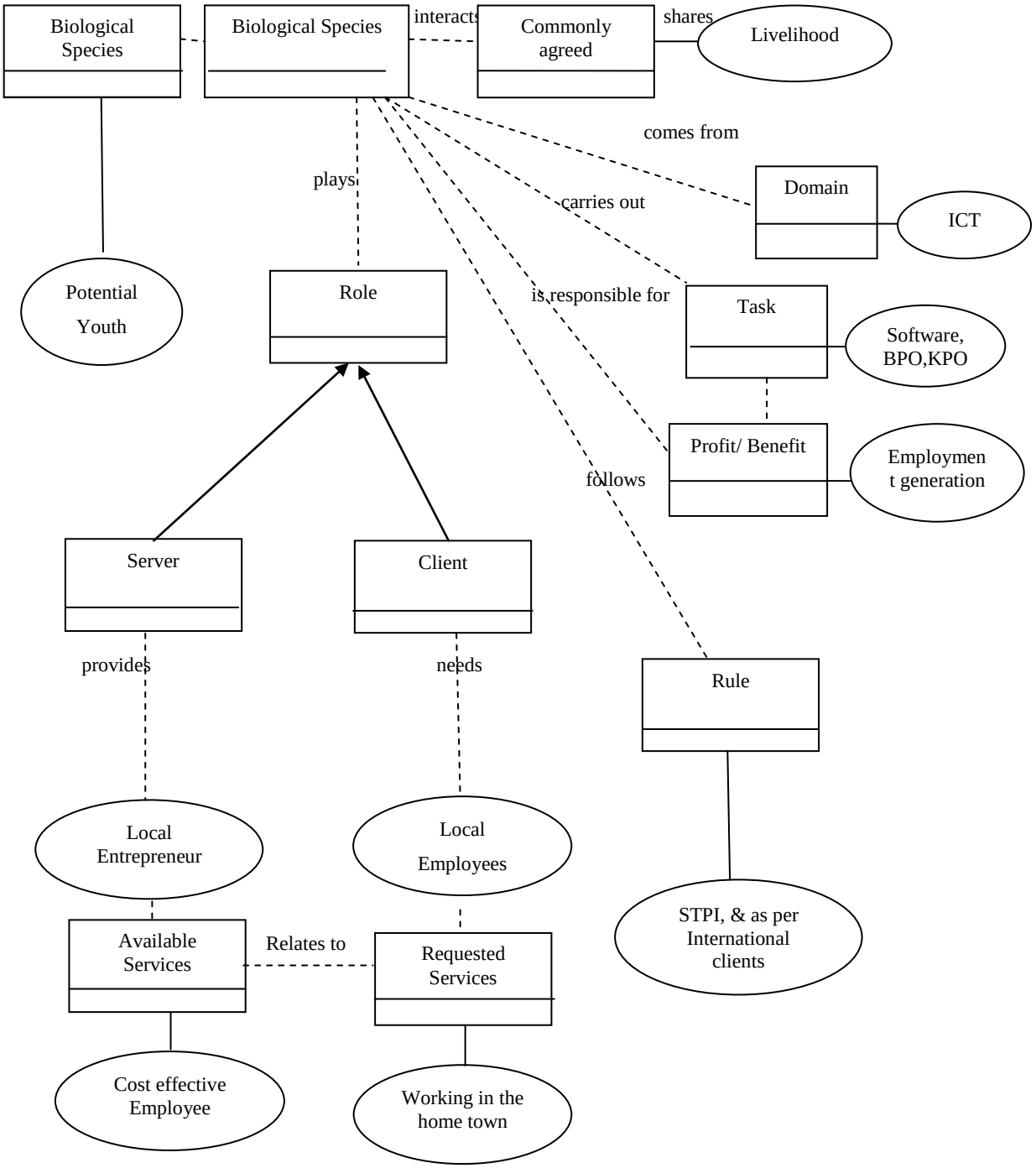

Fig. 1: Appendix A Biological Species Ontology of NER

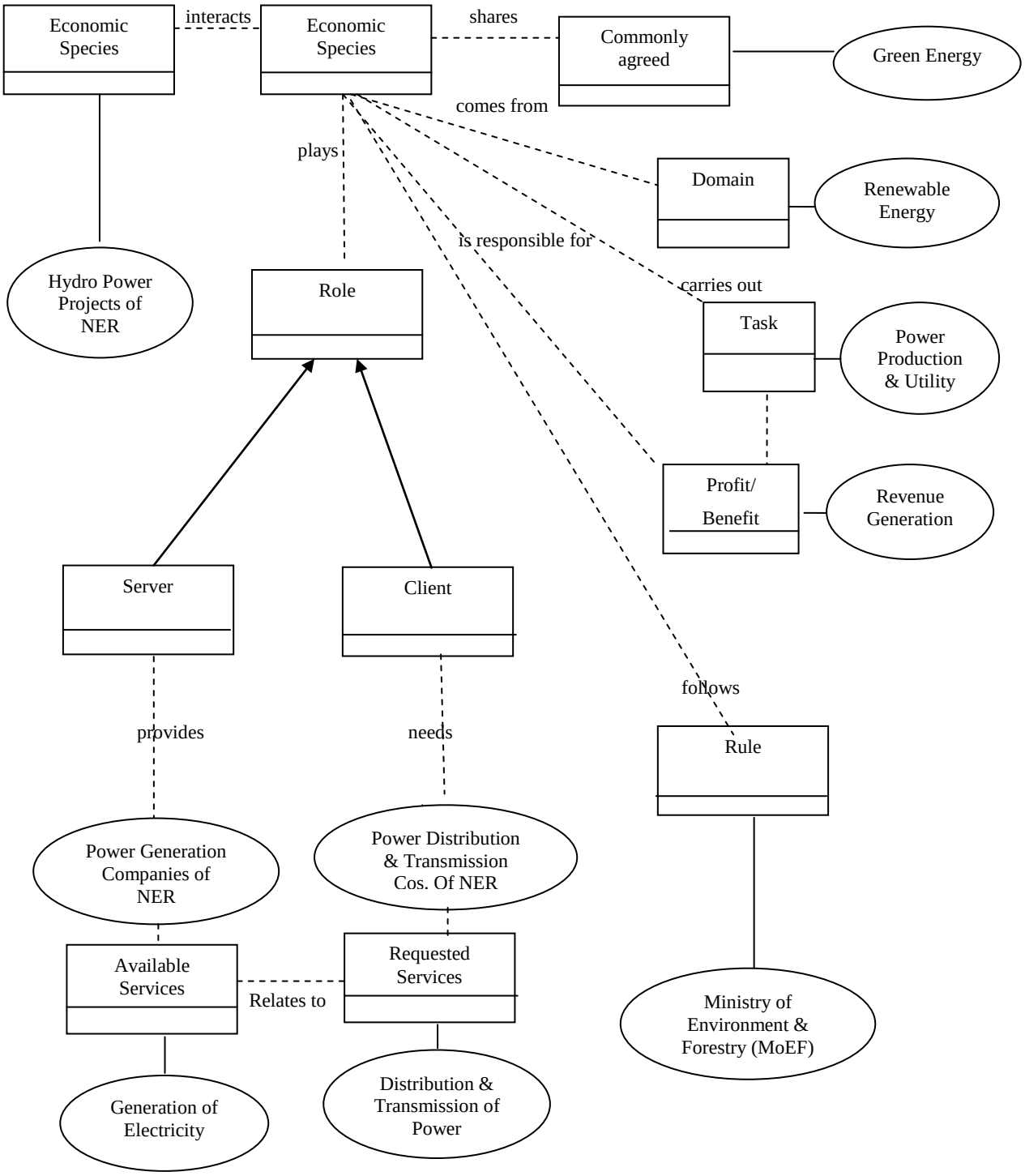

Fig. 2: APPENDIX B ECONOMIC SPECIES ONTOLOGY OF NER

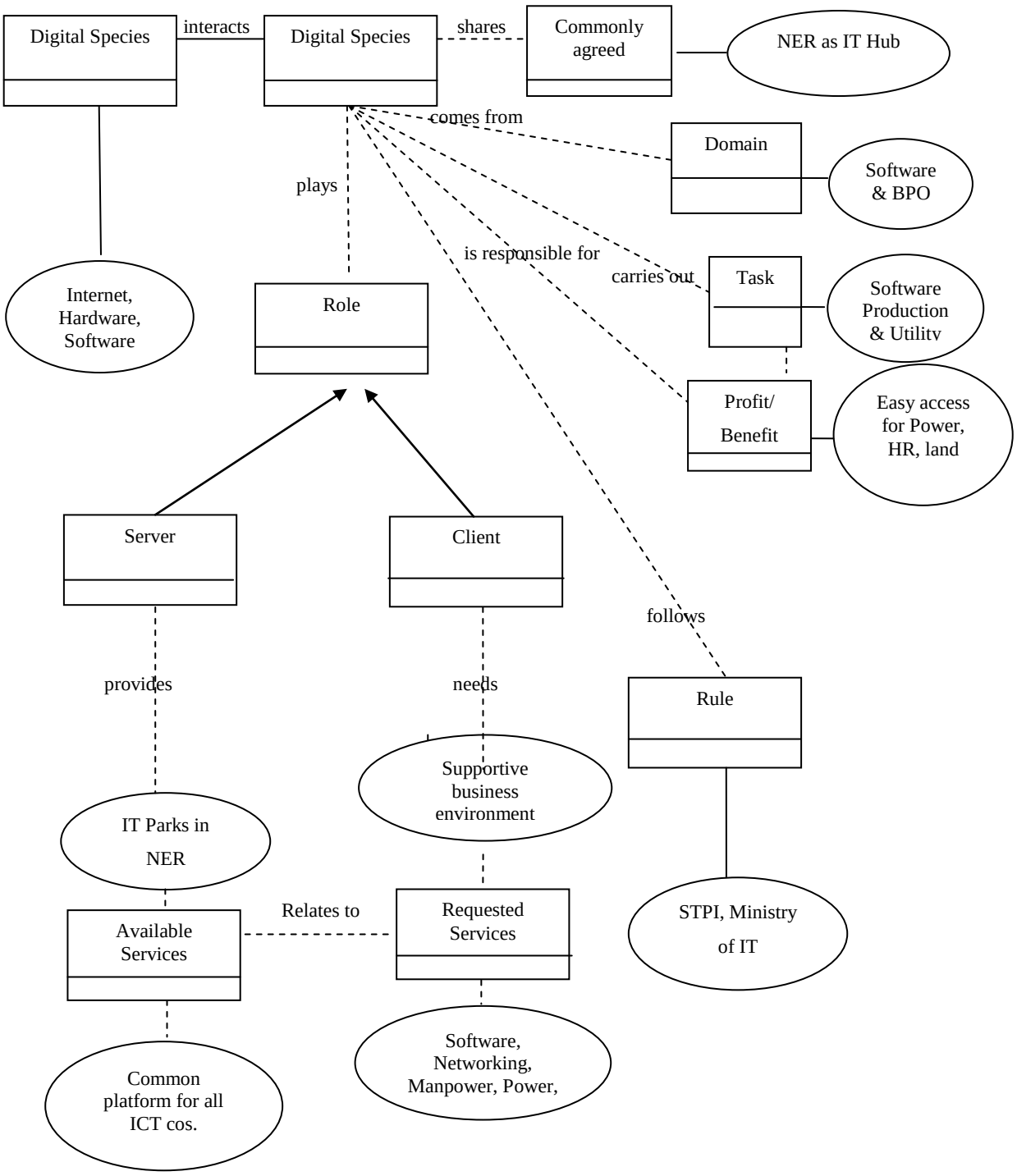

Fig. 3: APPENDIX C DIGITAL SPECIES ONTOLOGY OF NER

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