

A New PDS PORTAL for Clinical TeleGaming Rehabilitation and Intervention

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Abstract—A registry for resources relevant to Clinical TeleGaming, called CTGaming, has been added as a new Problem-Oriented Registry of Tags And Labels (PORTAL) to the collection of prototype PORTAL registries for ongoing development of the PORTAL-DOORS System (PDS). As a distributed system of interacting PORTAL registries and DOORS directories, PDS provides management services for who-what-where metadata about both online and offline resources. For the CTGaming PORTAL, the scope of the problem-oriented specialty domain for the registry encompasses gaming in physiotherapy, rehabilitation and intervention via telecare, and in general, diagnostic and therapeutic telegaming.

Keywords—Home telecare; diagnostic and therapeutic telegaming; rehabilitation and intervention; semantic web and grid; PORTAL-DOORS System.

I. INTRODUCTION

Clinical telegaming systems have been used for home care of patients coping with arthritis, post-stroke recovery and various other medical problems [1]–[3]. This report introduces a resource registry for clinical telegaming rehabilitation and intervention, called the CTGaming Registry, as a new PORTAL for the PORTAL-DOORS System (PDS) originally described in [4]. This report also provides further details on the new methods used to maintain and distinguish different problem-oriented specialty domains in PDS.

Figure 1 displays an overview diagram of a clinical telegaming system (CTGS) with an operational sensor array for monitoring the patient's interaction with the gaming console.

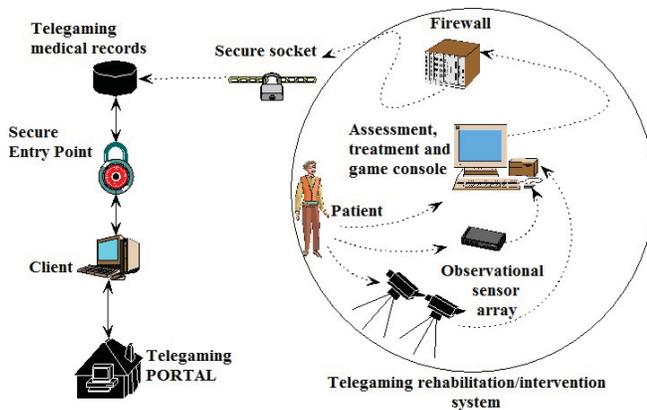


Figure 1. Generic clinical telegaming system.

Table I summarizes terms, definitions, and acronyms for all associated telecare systems for clinical telegaming.

II. PROBLEM-ORIENTED DOMAINS IN PDS

PDS specifies a set of data exchange interface requirements that facilitate interoperability and search across problem domains for both the original web and semantic web [4]. The administrators for any PORTAL registry implemented for PDS may declare a set of constraints which define the focus of its specialty domain or problem scope as a *Problem Oriented Registry of Tags And Labels*. Resource representations entered as records for a given PORTAL registry should be validated against the set of constraints defined for that registry. If the representations are not validated for the registry within the time period required by that registry, the records considered invalid should either be moved to a different more appropriate registry or else expunged [4]. Failure to do so, ie, allowing irrelevant and/or inappropriate records to remain in the particular registry, would defeat one of the most important purposes of maintaining a problem-oriented registry system, ie, search query efficiency.

The original PDS design [4] introduced *supporting tags* (formatted as text phrases) while the revised PDS design [5] subsequently introduced *supporting labels* (formatted as URIs) for metadata records describing resources. Supporting tags are intended for use with text phrases in a manner consistent with current conventional free-text tagging systems. Supporting labels are intended for use with URIs in a manner that references a controlled vocabulary, terminology or thesaurus as demonstrated in [6] for the NLM MeSH 2010 Thesaurus. PDS employs a bootstrapping design with a self-referencing self-describing approach. Thus, the metadata record for the CTGaming PORTAL Registry itself contains the lists of constraints used to define the problem-oriented domain for the registry. These lists can be found in the *registry restrictions* element of the *other metadata* element for the metadata record available for the CTGaming Registry at <http://pds.portaldors.org/npds/portal/CTGaming> which contains the word stems and phrases used for validity testing tags and the thesaurus concepts used for validity testing labels of other metadata records entered in the CTGaming Registry.

Table I
ACRONYMS TERMS AND DEFINITIONS FOR CLINICAL TELEGAMING AND ASSOCIATED TELECARE SYSTEMS

Acronym	Term	Definition
CTG	clinical telegaming	medical subspecialty focused on delivery of telecare involving diagnostic and therapeutic telegaming
CTGS	clinical telegaming system	telecare system enabling videogame-monitored diagnosis and/or videogame-guided therapy by incorporating one or more associated subsystems (TGRS, TGIS, TGMR, TGP)
TGRS	telegaming rehabilitation system	telecare hardware system enabling videogame-driven exercise therapy for rehabilitation in non-acute setting
TGIS	telegaming intervention system	telecare hardware system enabling videogame-driven monitoring and biofeedback for intervention in sub-acute setting
TGMR	telegaming medical record	telecare software system enabling management of private computerized records for patients' health-related information and telegaming sessions
TGP	telegaming portal	public web portal application and/or service enabling access to non-private telegaming resources

III. CTGAMING PORTAL REGISTRY

For the CTGaming PORTAL introduced here, the problem scope is declared as *clinical telegaming* and defined by requiring that records entered in the registry be related to the following concept groups: 1) clinical, medical, diagnostic, therapeutic, health care, rehabilitation, 2) telecommunications, telemedicine, telecare, telemonitoring, remote interaction, remote intervention, 3) telegaming, gaming, games, simulations, where validation requires logical **and** between all three concept groups and logical **or** for concepts within each group. There are special cases for which concepts from only two groups (for example, the pair of concepts “telecare and telegaming”) are sufficient for validation. Records entered for the CTGaming Registry are validated against these concepts by testing whether the PDS supporting tags of each record contain phrases with word stems matching the required concepts, or alternatively, whether the PDS supporting labels of each record match the labels for the required concepts. This mechanism assures that records entered in the CTGaming PORTAL remain true to its specialty problem domain defined as clinical telegaming. Public records in the CTGaming PORTAL are accessible at pds.clinicaltelegaming.net/ctgaming via a RESTful web service available with server responses returning resource representations in XML format. Example resource records are at <http://pds.clinicaltelegaming.net/ctgaming/resrep/>.

IV. CONCLUSION

A new problem-oriented registry, called the CTGaming PORTAL, has been introduced for the specialty domain of clinical telegaming and added to the growing collection of prototype PORTAL registries for ongoing development of the PORTAL-DOORS System [5]. This new PORTAL registry has been presented for use in association with an existing telegaming system [1]. The scope of the specialty domain for the CTGaming PORTAL encompasses clinical telegaming for rehabilitation and intervention, and more

generally, diagnostic and therapeutic telegaming. This public CTGaming PORTAL serves as a repository for metadata representations of resources pertaining to the problem-oriented domain of clinical telegaming. The CTGaming PORTAL also serves as an interface to the semantic web for a private telegaming medical record subsystem used for clinical care records, research data, and telegaming sessions from the custom videogames for rehabilitation or intervention therapy in the overall system.

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