

# Collecting Data on Informal Learning through Interactive Television

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**Abstract.** Informal learning constitutes a large portion of our daily activities. With the development of digital technology easy access to useful information is only a touch or a click away. An innovative project TRAILER funded by European Commission proposed a new way of gathering information about informal learning. The goal was to enable a person to collect the data about its activities in informal learning and open this information to the public (formal institutions, friends through social media etc.). Informal learning can be done through various Web 2.0 platforms, mobile apps, personal learning environments and video games. One media that was unintentionally left out of the picture is Television (TV). For decades people are watching TV and are gaining useful knowledge. The progress in digital and smart television opened a new way of interaction with the television, where users are given the opportunity to interact with multimedia material. Also, internet protocol became an underlying protocol for streaming and managing television program. Today, the TV device has the ability of being an active participant on the Internet. People now have the opportunity to also share their learning experience created by watching a TV with the public. The goal of this paper is to extend the idea set in TRAILER project of collecting informal learning information to the very important media of television.

## Introduction

It is a known fact that television (TV) can be a good source of learning. Since the mass introduction of television in to people homes, scientists are trying to interrogate the learning potential of this media. Some of the early social studies indicated that children are adopting knowledge on social terms such as occupations and social status at as early age as 6 [1].

The significant advance in digital media technology drove the rapid changing of the television as a media. The changes are evident in all areas of television broadcast, starting from recording through emitting and all the way to presenting. The most important switch occurred in the transmitting area, since multimedia data is now distributed digitally, rather than through analogue signal. Nowadays, television rests on the same paradigm as the Internet, and that is transfer of data through a packet switching network. This enables a wide range of communication mediums to transfer TV data, regardless of being guided (cable) or unguided (earth and satellite radio). This technological shift opened the door for introduction of interactive television (iTV). This new way of using television technology enables viewers to take active part in TV viewing experience. Some of the new activities are managing your TV program, sending messages, ordering TV program and similar. Also, one of the most

important additions can be found in the ability to extend your informal learning and make it interactive.

Informal learning [2], which takes place in the context of everyday experience, emerges from the activity rather than being planned. This notion specifically speaks in favor of television as an excellent platform of informal learning. We usually watch TV as a part of our leisure activities and learn from it without learning being the primary purpose. Most of the time, we do not share such learning experiences with the public. This is especially true when it comes to communication with formal institutions. For instance, when a person applies for a job, internship or some grant, that person is evaluated through knowledge acquired in formal institutions, such as University or other courses. Knowledge acquired through informal learning is left out of the picture.

Project TRAILER [3], funded by European Commission, aimed at creating a framework that enabled learners to collect, tag and present their learning experiences to formal institutions. The developed system rested on the idea of a specialized service called Informal Learning Collector (ILC), dedicated to collecting Informal Activities (IA) in order to make them presentable to interested parties. This involved gathering IAs from different platforms such as social media, Web 2.0, mobile platforms, personal learning networks, educational games etc.

The idea behind this research paper is to extend the idea of TRAILER framework in order to be able to collect IA created during the experience of watching interactive television. The fact that current television is interactive and enables a two-way communication opens the ability of using some open standards to collect and share IAs that are a result of interacting with the TV.

Next section gives an overview of the state of the art. Third section is dedicated to identifying the problem of sharing informal learning experiences from watching TV. Section four gives the overview of the proposed solution. Final section discusses and concludes the work.

## **State of the Art**

Television has proven itself as a good tool for learning. For that very reason it was introduced in to many classrooms and is used in order to achieve the goals set by formal learning criteria. Unfortunately, television as an informal learning tool still retains a lot of mystery to researchers. This is mostly due to the fact that formal approach to science affects the informal notion in informal learning. Informal learning, takes place in day-to-day life activities, related to work, family or leisure and may be intentional but in most cases it is non-intentional or incidental and random [4].

TV has been reported as a good tool for learning a language or improving language skills [5]. Besides language, TV has proven as a valid platform for building knowledge on social interactions [6]. Other than that, TV was proven to influence behavior, attitudes, beliefs and values, knowledge, and cognitive skills [7].

Even greater opportunities for learning opened with the development of interactive television. This new way of presenting multimedia material enabled the use of many forms of interactive content. It even opened a path to establishing a new research field of t-learning [9, 10]. Interactive nature drove the learning towards a more socially aware context. There were attempts to investigate the effect of collaboration on learning [11]. One study reported that using instant messages during the conduct of the program actually improved the experience in children population [12]. Shifting the television technology towards an Internet based model naturally drove the development towards connecting the television viewing experience to social media. Market and research community started delivering the tools for achieving convergence and use of different devices as part of the same cross media system, allowing support to a multiplicity of contexts of use [13]. An attention is drawn towards building the material that is suitable for use with social media environment [14]. It is

evident that sharing the learning experiences with peers or interested institutions can significantly improve the informal learning outcomes.

Newly established interactive model, which enables an active participation of TV viewers on the Internet during watching experience, will open a whole new set of applications [15]. Open nature of broadcasting standards such as Hybrid broadcast broadband TV (HbbTV) [15], allows development of diverse solutions to be applied in collecting informal learning activities and sharing them with the public.

### Collecting Informal Learning Activities

Informal Learning is a longstanding mode of developing personal efficacy. People as individuals learn in different contexts, including their interactions with other people. First definitions of informal learning started appearing during the first half of the twentieth century [17, 18]. This area of research is truly gaining momentum in the previous decades since the sources of informal learning exploded with digital era.

Today a large portion of one's knowledge is acquired out of the formal loop. Unfortunately, formal institutions are left without proper insight in to people's informal learning activities. This issue was tackled by the research team gathered around project TRAILER. The TRAILER project provides a methodology supported by a technological framework to facilitate communication about informal learning between businesses, employees and learners [19]. The framework proposed covered a variety of different platforms that enabled learners to achieve informal learning experiences and collect them in to ILC (Figure 1).

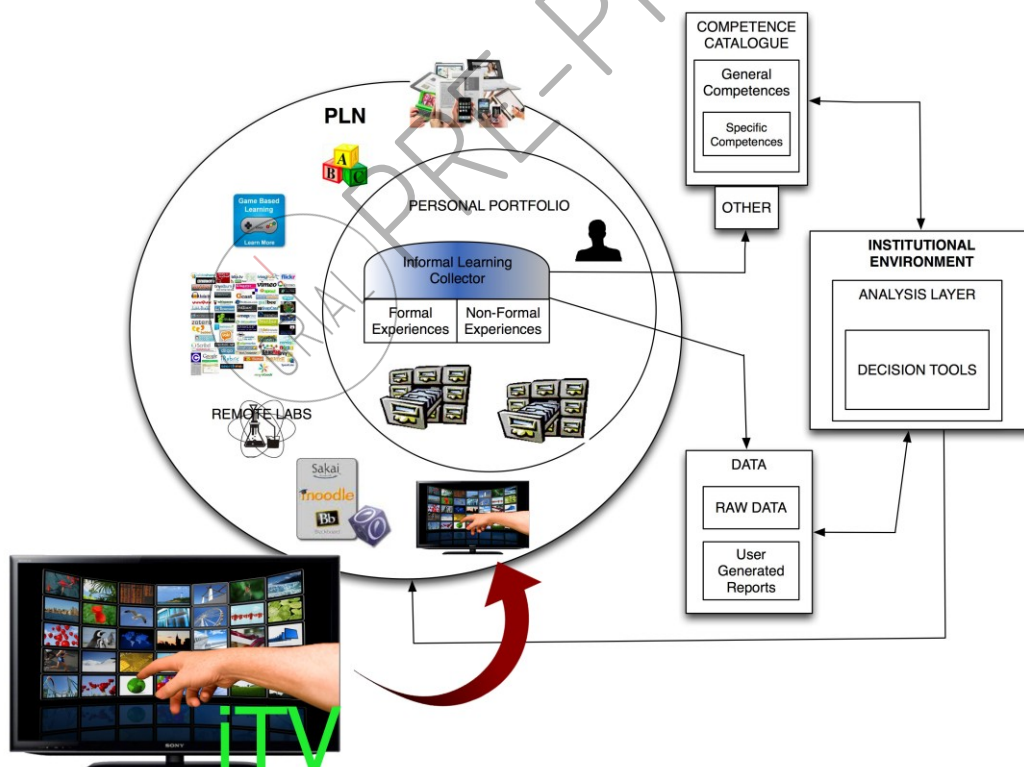


Figure 1. TRAILER framework with the addition of including informal learning from iTV

In this paper, we will present one important addition to the framework. Since the model is open and allows connectivity among variety of platforms, the plan is to attempt to include interactive television in to the mix. Television is very important as a source of informal learning especially because it reaches population that is less technically advanced.

In the next section we will present the architecture of the proposed system, including specifics on interoperability and inter-platform communication.

## System Architecture

In order to enable sharing of informal learning activities that are result of TV viewing experience the largest obstacle is in establishing of communication channel between the iTV and the ILC. For this purpose we suggest a development of a specific application capable of running on the device supplying the service of interactive television (usually referred to as set-top box or unit). This application would offer user the ability to send the information about the program currently being watched to ILC. Afterwards the process of managing and sharing the ILA with the public is the same as with ILAs coming from every other platform [19].

The development of the application requires following a standard set by the community gathered around interactive television broadcasting such as HbbTV [16]. The standard provides the ability of making a specific type of broadcast-related auto-start applications. The user interface provides the user with the information that an app can be started using the remote (typically press of the remote red button as seen in top of Figure 2). In our case this app opens a specific dialogue that enables the user to send information on what program he is currently watching to the ILC (bottom of the Figure 2). It is important to note, that this type of applications is dependent of the broadcaster, so a specific broadcaster would have to include it in the offered package for viewers to be able to use the service.



Figure 2. User interface of the application for sending ILA to ILC



The informal learning is shared using the ability of HbbTV standard to use Internet connection as a separate communication channel from broadcasting. This feature is one of the main driving forces for interactive television, which enables connecting broadcast network with the Internet. As the user interacts with the program broadcasted, he is opted to share information on his informal learning (Figure 3). When a user opts to send information to Informal Learning Collector, a process is started that initially extracts meta-data on the current program, using the information provided in Electronic program guide (EPG). Data retrieved is structured in to a service message, a socket is opened towards the server hosting ILC and the data is send via HTTP. The message contains authorization data as required by the TRAILER framework [19, 20] (based on user/password set). The initial model is open, but in the future we plan of introducing HTTPS as a more secure option.

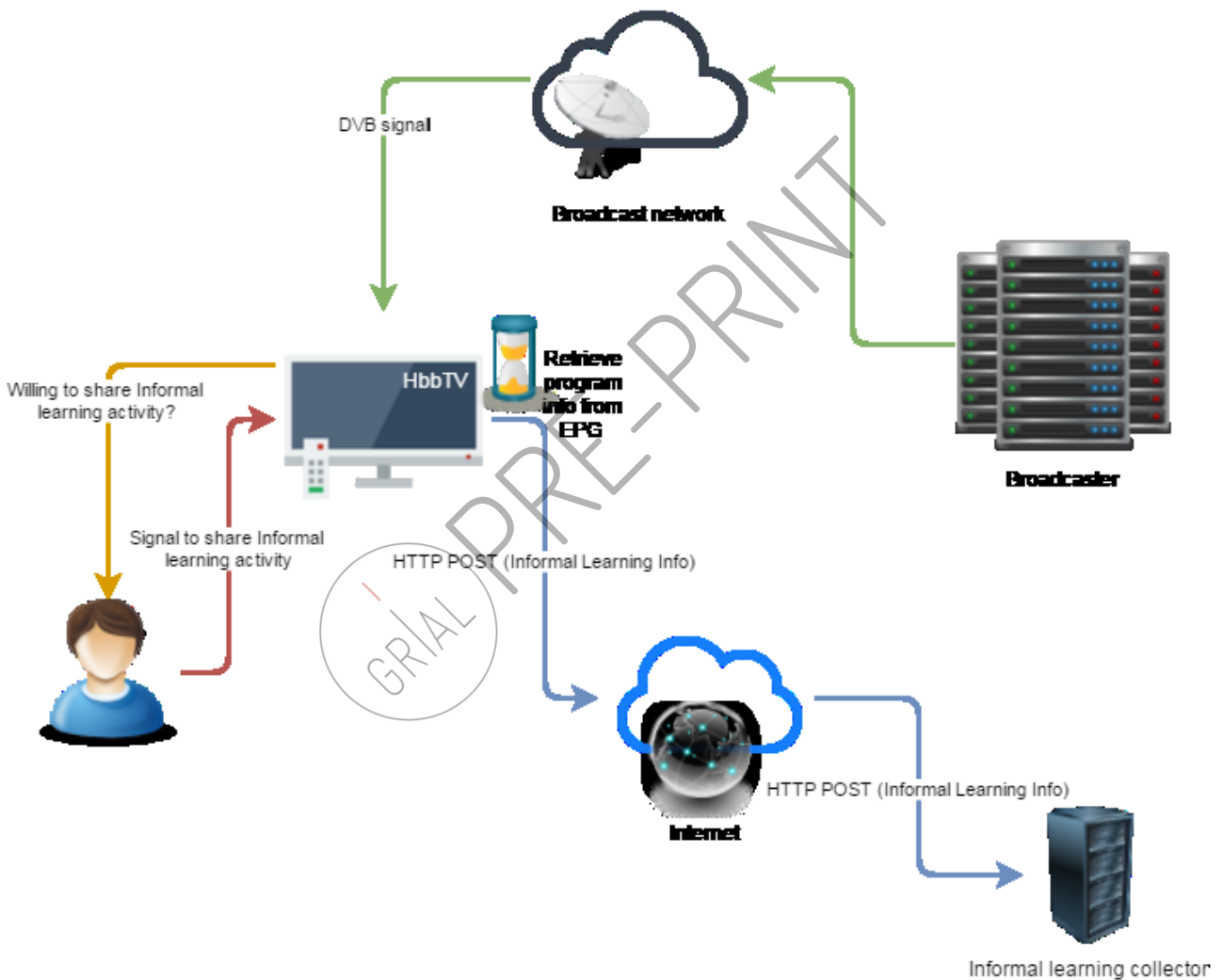


Figure 3. Architecture of the proposed system

Informal learning application will be implemented utilizing HTML5 and CSS3, standard web technologies, also suitable for development of iTV applications compliant with HbbTV 2.0. User interface is adopted for TV as a media (see Figure 2). The application is run as an auto-start, and XML AIT (Listing 1) is encoded in the multimedia stream. Proposed approach uses a pull data method [20] for sending informal learning activities (ILA) to informal learning collector (ILC), because client application actually pulls ILA from the content that user consumes (iTV content in this case). Major advantage of this is that user does not have to

enter learning activities manually; user just confirms that he wants to send some activity, and message will be prepared by client application, using all relevant metadata for content. This should result with be much higher number of recorded informal learning activities.

```
<?xml version="1.0" encoding="UTF-8"?>
  <mhp:ServiceDiscovery
    xmlns:mhp="urn:dvb:mhp:2009"
    xmlns:hbb="urn:hbbtv:application_descriptor:2014">
    <mhp:ApplicationDiscovery DomainName="dummy-broadcaster.com">
    <mhp:ApplicationList>
    <mhp:Application>
    <mhp:appName Language="eng">Sharing informal activity</mhp:appName>
    <mhp:applicationIdentifier>
    <mhp:orgId>123</mhp:orgId>
    <mhp:appld>456</mhp:appld>
    </mhp:applicationIdentifier>
    <mhp:applicationDescriptor xsi:type="hbb:HbbTVApplicationDescriptor">
    <mhp:type>
    <mhp:OtherApp>application/vnd.hbbtv.xhtml+xml</mhp:OtherApp>
    </mhp:type>
    <mhp:controlCode>AUTOSTART</mhp:controlCode>
    <mhp:visibility>VISIBLE_ALL</mhp:visibility>
    <mhp:serviceBound>>false</mhp:serviceBound>
    <mhp:priority>1</mhp:priority>
    <mhp:version>01</mhp:version>
    <mhp:mhpVersion>
    <mhp:profile>0</mhp:profile>
    <mhp:versionMajor>1</mhp:versionMajor>
    <mhp:versionMinor>3</mhp:versionMinor>
    <mhp:versionMicro>1</mhp:versionMicro>
    </mhp:mhpVersion>
    <hbb:ParentalRating Scheme="dvb-si" Region="GB">8</hbb:ParentalRating>
    </mhp:applicationDescriptor>
    <mhp:applicationTransport xsi:type="mhp:HTTPTransportType">
    <mhp:URLBase>http://ilc-trailerproject.dummy-broadcaster.com /</mhp:URLBase>
    </mhp:applicationTransport>
    <mhp:applicationLocation>ila-to-ilc.html?a=1</mhp:applicationLocation>
    </mhp:Application>
    </mhp:ApplicationList>
    </mhp:ApplicationDiscovery>
  </mhp:ServiceDiscovery>
```

Listing 1. XML AIT for the auto-start app for sharing IA

Informal learning collector is implemented as a web service for Moodle, providing variety of communication protocols, such as JSON, JSON-RPC and REST. Authorization mechanism can be based on OAuth or username/password. Web service method that should be called is `send_to_ilc()`. Interface definition is given in Table 1.

<b>Method name</b>	<code>ilc_send_to_ilc</code>
<b>Description</b>	Inserts an Informal Learning activity in the Collector queue
<b>Parameters</b>	<code>url: String; title: String</code>
<b>Returns</b>	<code>Id: Integer</code>

Table 1. ILC interface definition

## Conclusions

The aim of the TRAILER project is to enable learners to collect, tag and present their informal learning experiences to formal institutions. By means of the ILC, users can collect their informal learning activities from different platforms such as social media, Web 2.0, mobile platforms, personal learning networks or educational games. Although TV has proved to be a good tool for learning, it was not considered as a source for the ICL in the first version of the system.

Therefore, in this work we presented an extension to the project to be able to collect IA created during the experience of watching interactive television. By using the HbbTV standard, when users are viewing a program that can enrich their learning, they can access the ICL to record the information of the current program provided by the EPG. Consequently, users will be able to share their iTV informal learning experiences with interested parties.

Future work will include usability tests to analyze the effectiveness and efficiency of the system, and the satisfaction of the user when operating with it. Further, it will also be interesting to be able to register the information of the TV programs on demand.

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