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OPERATING EUROVISION AND EURORADIO

TECH 3365

FUNCTIONAL REQUIREMENTS FOR INTEGRATED NEWS ROOM SYSTEMS (INRS)

Geneva
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This document contains both normative text and informative text.

All text is normative except for that in the Introduction, any section explicitly labelled as 'Informative' or individual paragraphs which start with 'Note:'.

Normative text describes indispensable or mandatory elements. It contains the conformance keywords 'shall', 'should' or 'may', defined as follows:

'Shall' and 'shall not':	Indicate requirements to be followed strictly and from which no deviation is permitted in order to conform to the document.
'Should' and 'should not':	Indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others.
	OR indicate that a certain course of action is preferred but not necessarily required.
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A conformant implementation is one that includes all mandatory provisions ('shall') and, if implemented, all recommended provisions ('should') as described. A conformant implementation need not implement optional provisions ('may') and need not implement them as described.

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Functional requirements for Integrated News Room Systems

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1. Introduction

Between 2011 and 2013 the EBU has visited several EBU Members with integrated newsroom systems. Many systems provide satisfying functionalities; however Members have also expressed additional requirements, which would enable them to create workflows with higher production efficiency, especially for bi- and tri-media newsrooms.

The overall objective and motivation for Members for redesigning the news room environments is to produce News Content for all Devices *"Easier, faster and stronger, more monitored (more visibility/usability) and at the same user interfaces"*

The approach of this document is to provide a set of fundamental high level recommendations for integrated newsroom systems that are backed up by some more detailed technical information. The supplier industry is requested to take note of these requirements in future system development.

2. Fundamental Requirements on Cross Media News Production

Cross Media intends to deliver an experience to the consumer that is distributed through and across different media and devices. As a consequence, cross media news production faces the challenges

- to feed a plurality of media and devices in a (cost) effective way from a joint production process, but also
- to consider and to develop "the news product" as a joint synopsis of all the information offered to the consumer across different media.

These challenges result in a series of fundamental requirements for the planning, production, archiving and delivery process, as well as for the news product itself.

2.1 Planning, search and acquisition

2.1.1 Cross media planning for content

Integrated News Room Systems (INRS) shall provide technical systems for joint planning across media types, delivery channels and various kinds of consumer devices. In more details, the system shall allow to plan and to negotiate within an editorial team:

- which content elements of a "cross media story" and which information shall be delivered

- at what time
- with what effort and resources
- through which delivery channel
- to which kind of media.

Note: In smaller environments, cross media planning can often be achieved by co-locating all involved people in a joint area, thus permitting personal communication. Medium size environments may require technical support systems such as electronic flipcharts and scoreboard-like displays, etc. Large size environments may require more elaborate notification and planning systems.

2.1.2 Cross media planning for resources (technical and human)

INRS shall allow the management of resources for investigation, acquisition and production processes in an effective way. This may cumulate in more work-sharing workflows where e.g. single journalists are responsible for acquisition of material on different topics and continuously submit this content remotely via mobile contribution links, whereas other journalists supervise completion of the production. Such work-sharing workflows may in turn require additional tools for content contribution, resource allocation, and possibly in the longer term, also including budget and resource monitoring.

2.1.3 Cross media acquisition and search

The acquisition process shall allow acquiring various media types in parallel. This applies for the technical equipment of journalists, the ingesting process, and for searching in archives. Thus, INRS shall allow for acquisition and search of all kinds of media types in a similar and harmonized way (e.g. by means of a context/media sensitive portal application). In more detail, search processes shall be capable of retrieving any kind of information matching the search criteria, independent of a media type. Metadata available during this process – such as information about the material origin, and potentially related rights information - shall be preserved for further downstream usage.

Note: This typically requires a content management system that is capable of managing (i.e. search, retrieve, move) audio, video, pictures, textual information and – in next generation systems - possibly even complete assemblies of these assets.

2.2 Product requirements

A "cross media product" (called "story") may vary dependently on which type of media shall be supported for distribution, whether distribution is in non-synchronized or synchronized along a joint timeline, whether interactive components are included and whether interactive feedback is used to modify the "story". The system should be able to version content. Different versions of text and video are typically needed for television, radio and web publishing.

2.2.1 Elements of the news product

INRS shall allow the definition of a "story" in a modular way with the following key features:

- Story can be defined as a news item that has a subject (a person or thing that is being discussed, described, or dealt with)
- Story can be a very short news item or even a whole program, which is focusing on a single subject.
- Story can have different levels of effort that will be used to cover it

- Story can have multiple versions
- Story can have different editions for different outputs
- Story has different elements. For some outputs (media and/or devices), not all elements may be needed.
- Story can have at least1 the following elements or references to them:
  - Text
    - Lead in / out
    - Script to speak
    - Text for publication
    - Text to feed graphics fields (lower thirds, OTSs, etc.)
  - Video
  - Audio
  - Picture
  - References
    - Programmes
    - Output times
    - Output sections
  - Relations
    - To rundowns
    - To users – journalists, video editors, photo shooters, graphic designers…
    - To other stories
    - To planning items
  - Classifications
    - E.g. domestic, foreign, politics, …
  - Archiving info
    - description
    - keywords

2.2.2 Modular composition of the news product

Ideally, INRS shall handle individual components of a story "virtually separate" throughout the planning and production process. "Virtually separate" means that is shall be possible to access individual components separately, even at a very late stage of production. Examples are to access one part of the timeline, or to access subtitles and source video (e.g. without burned in overlays) separately. An INRS may support "virtually separate" streams by adequate means, e.g. by either rendering all components just before distribution, or by carriage of adequate metadata and by selecting adequate metadata models throughout the production process.

2.3 Distribution coordinated across media

Whereas there is consensus that different media have different ways of storytelling and thus the production processes and finishing of these products may be kept separate, future INRS may require to establish a more controlled alignment of product distribution across various media and thus to jointly align playout systems across media delivery channels, and/or to closer connect these with

[1] The sample list has been created mainly for audiovisual media. For other media, adequate sub- or even supersets may apply.

the above mentioned cross-media planning system. Examples may be to align information in a hybrid broadcast broadband application, or – for advanced second screen experience - to even align video, audio or textual tracks on a timeline across various devices used by the consumer.

3. Systems requirements

The functional requirements as identified above impose a series of challenges on the underlying technical systems, concepts and workflows.

3.1 Technical systems

3.1.1 Portals

It should be as easy as possible to access media, text and all related information for all journalists and other people working with production, so that every journalist can concentrate essentials of the final product. A single portal shall offer a view across the whole content management and possibly also the production system environment. Users don't need to know where media is located in system, database, storage or physical location. The media shall be presented to the user by its metadata and not only by its digital file info (filename, URL etc). Access to "the portal" should be available regardless of the location or the user's platform (device). The portal can have some media production tools included or it can give access / links to those tools. Views, tools and access rights need to be customizable per user role. In general, the INRS shall export a reduced number of GUIs, designed as "single Portal" across whole production system environment.

In order to reduce (functional) overlap between subsystems (components), the system architecture of an INRS should follow a modular approach, e.g. the Service-oriented Architecture (SOA) paradigm. This approach allows to use specific functions of subsystems in more than one production workflow or process, and thus a better use of resources, e.g. through load-balancing between several instances, even across several facilities.

- Components shall be kept as modular as possible with a minimum of overlap of functionalities.
- Components shall export internal functionalities on a level as granular as possible through a flexible interface that is ideally common to all components. Since fully harmonized interfaces are unlikely to being achieved in a multi-vendor environment with continuous maintenance, updating and replacement strategies, an SOA-based approach using adapter technologies may support integration.
- Components should provide SOAP or RESTful APIs
- Components shall provide "only" individual functions to an external controlling system, ideally based on standards such as FIMS.
- It shall be noted that the modularity of technical components is typically not exposed to the user. The portal shall offer an intuitive and ideally context sensitive way to initiate any processes that are further executed by one or more of these components.

Components shall support asynchronous communication, such as polling and call-back functionalities, in case of long running processing.

3.1.2 System management

A simple GUI shall be provided to manage the system; the prior aim is to do this without training.

Broadcasters need to be able to manage the workflows themselves, so the system must support external workflow systems to be able to handle specific tasks.

A Business Process Management System (Monitoring) shall provide a general task overview (including all running jobs also in external systems) in an easy readable way included in the GUI.

The aim is to help all staff members to quickly check running tasks and to identify the status of a system by themselves without involving an engineer

In more detail, the Management GUI must provide access to:

- All current running tasks (ingest, playout, transcoding, QC, archive, retrieve, workflows)
- a simple control to start stop pause or cancel, or prioritize
- Available capacity of systems
- User Management: required/roles -> GUIs
-
- Workflows: Broadcasters need to be able to manage (or "make changes to"?) the workflows themselves
- Monitoring: Business Process Management and System
- User Management with defined roles for individuals and for user groups with customizable GUIs
- "agile approach" to allow addition of components/functionalities at a later stage

3.2 Metadata

Metadata is essential to advanced cross media production. Metadata provides the links to essence. As a general requirement, metadata shall be the leading element rather than essence elements.

The metadata object is the key object with a unique ID. This object represents the editorial object, i.e. the story the journalist wants to tell. To the metadata object all other objects such as videos, audios, stills, text and attachment are connected.

In the world of news, metadata is provided by a variety of sources including news agencies. Actually news content consists of metadata such as headlines, slug lines, datelines, subjects and links to associated media (pictures, audio, video, text) or web resources.

A good data model is a fundamental requirement to accomplish this. It is in particular important to separate the editorial object from its essence (which can take several representations adapted to different media).

It is becoming common practice to associate a unique ID with a story, to collect metadata contributing to its enrichment, and associate media resources.

One of the leading metadata models for news is the IPTC NewsML-G2, to which the EBU contributed on the media extensions, and which is in daily operation within Eurovision. Other models have also been developed by the EBU with Tech 3293 EBU Core and the Tech 3351 EBU Class conceptual data model, or by Members using individually adapted solutions.

The metadata model chosen must be able to describe different versions and formats, and the relation between them. In many of the publishing channels the metadata is essential for the delivery of content to the audience. The content will be searched for, not pushed at a given time as it used to be in traditional broadcasting.

The different versions and formats produced in the editorial processes must have an accurate description of metadata associated with rights. The use of stock-shots and music will inflect complex rights issues that can vary along the timeline, and that will be different for the different output platforms. No modern broadcaster will have the resources to describe each item in detail,

and the metadata provided will cover the story, not the elements used to tell the story. Therefore it is essential that the metadata of the source material are preserved during the editing process. Additionally, the INRS may provide tools for automated metadata extraction or metadata enrichment. Such metadata, however, may need a clear distinction from metadata entered and verified by a user.

3.3 Archives

The system must be able to archive (if the user's role allows archiving) a story with a link to the media in its highest quality (if the quality of published media is lower than that maintained throughout the production chain). The system must also be able to manage the coexistence of different qualities of media, e.g. a 50 Mbit/s XDCAMHD TV product and an 8 kbit/s MPEG-4 HD web product. The system must be able to independently restore any element of a story and 'partial restore' any media file. When restoring archive these media must be converted quickly and with transparency into a format that is useful to the user, depending on the tools he uses and on the publishing platform. The system should, however, avoid unnecessary conversion and/or format change in order to minimize conversion artefacts.

Metadata stored in different media must be consistent. The publication history, as well as the metadata, is very important in an Integrated Newsroom in order to keep the genealogy of the media intact, to declare in which edit or publication the media was used.

An added value would be a timeline for each story published, gathering information from the various broadcasts, audience figures if available (combining linear and non linear audiences). Finally, the management of the exploitation rights must take account of different platforms and inform the user (and possibly his editor-in-chief) in case of breach.

3.4 Business Process requirements

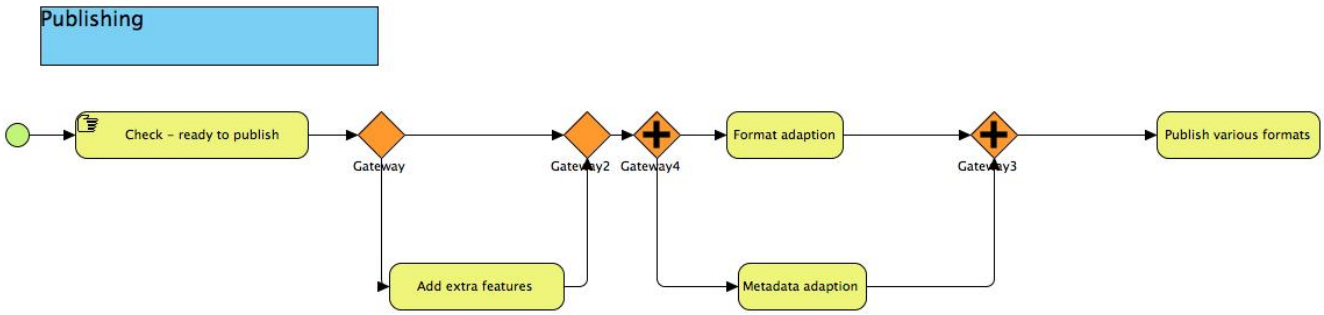
3.4.1 Production flexibility and speed

From the start, the system must consider each incoming media as being able to live several lives in different worlds. To be quick and flexible, the system must integrate the most automated workflows in order to easily distribute content to traditional media, websites, tablets and smartphones, but also tomorrow to yet unidentified environments.

Video production for web might require more agile tools and lightweight formats than tools used in television production. Multiplying the amount of video that a broadcaster produces to web by e.g. ten may not be possible in a cost-efficient way using present television oriented video production tools.

3.4.2 Publishing

Publishing to several kinds of media or delivery channels shall be supported in an automated way. Since this process may vary for different outputs (e.g. TV, radio, web media and also different devices), it typically will include re-packaging of a news product, transcoding and other adaptations, as well as quality checking.



The example process described in the diagram is about a check if the material is ready to be published. This is a manual task. When satisfied, extra features may be added to the material, but it's not necessary. Then two processes are run. This is adaption to the needed metadata scheme and formats, and the essence format adaption. When this is done, various formats of essence with metadata may be published.

3.4.3 Editing (rough / craft / graphics /audio)

For Integrated Newsroom Systems (INRS), an editor-like tool is required to evaluate after a search rich media hits and find out if the material is relevant and useful for a specific story or production. Such a tool, which could be named "media editor", should fulfil some basic requirements, such as:

- simple and straightforward to use without training
- should not require specific editing skills such as video- or audio editing
- display and playback of video, audio, text, stills, and graphics (selected formats)
- display in separate panes all information available for the video the system linked to this media, such as text, timeline dependent data from MAM systems, speech to text results, faces, logos, etc.
- display this data in timeline-synchronized mode during playback of video/audio
- support generation on EDLs from both video and audio
- support editing of video/audio by defining in/out points not only by video/audio but also by marking of text sections, faces and logos
- support easy recording of voice-overs, being able to play video while recording audio
- support export of selected single frames from video
- support export of audio tracks only from selected video
- all editing, marking and logging shall be frame accurate

3.4.4 Material acquisition

- Searching: system must have functions as auto complete, fuzzy search, stemming. Research must be done on all types of objects defined in the MAM. The search engine must enable the backup and recall of prior searches. It may also support the definition of customized search templates and further dynamic, context sensitive functions.
- Added value would be a module which also can search on network drives and emails and multiple systems simultaneously.
- Browsing: all media acquired by the system, including archives; possibility to browse different versions of work
- Selection: e.g. bin with any kind of essence/metadata: creating sub-clips by mark-in mark-out on LR (either on feeds), back-up of sub-clips in private (or shared) bin; protection from deletion of original media while a sub-clip is in a bin
- Transfer: in addition to the general requirements for ingesting (see below) the system shall

provide an easy way to acquire material from external users, such as external production facilities, actualities captured by mobile devices and user generated content. This functionality may require automated and manually assisted transcoding in some cases. All material shall be transferred with as much accompanying metadata as possible. For previously planned and outsourced acquisitions, metadata shall also be used to direct incoming material to the relevant production queue.

3.4.5 Ingesting

- With ingest, speed is essential. The acquired material must be available as quickly as possible for use at least in low resolution (i.e. a proxy). Users should be able to ingest video and audio material directly from the field into the INPS using the public internet. For video, this can mean using cameras that can create proxy files for rapid transfer to the system for viewing, rough-cut editing and web publishing.

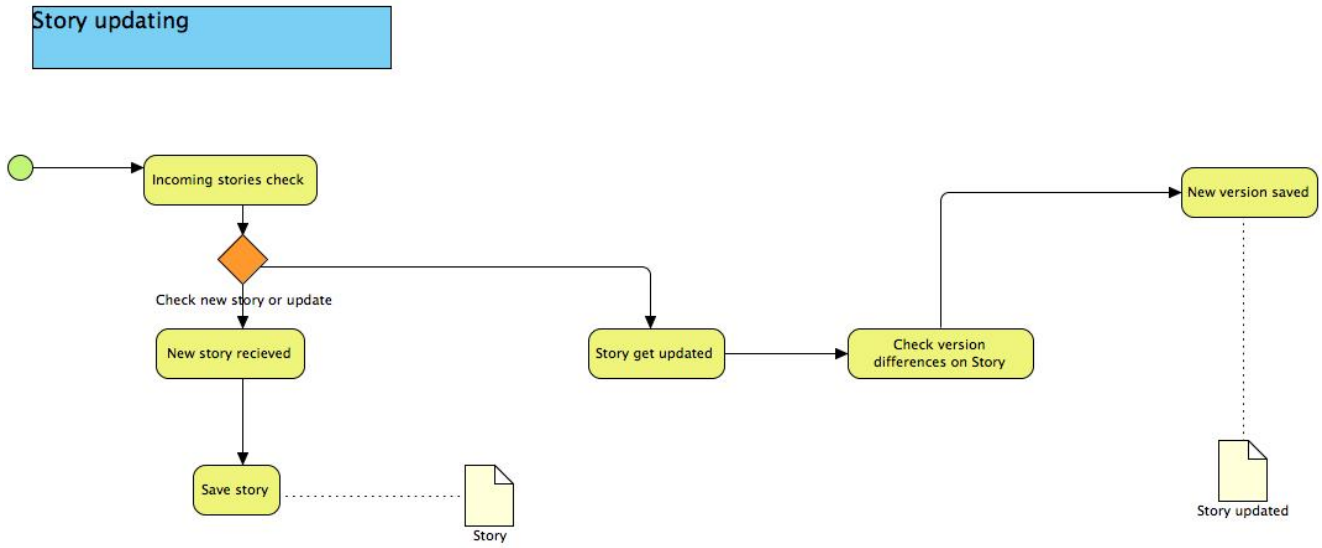
  Later on the hi-res media should meet its proxy in the system, thus, replacing it in workflows where hi-res media is required. Five times faster than real-time would be a minimum for closed files. The availability of the proxy on feeds into the INPS should be not later than 10s after the start of the recording.
- File based ingest is the standard of modern systems. Dependently on the broadcaster's individual requirements, tape based ingest may be required and may also be handled with a different priority than files.
- The system must be able for file ingest:
  - To show arriving files and if possible support "edit while transfer", i.e. allow access to those files which are still in transfer (for fast turnarounds etc.). Proxy generating, transcoding, editing shall be possible with growing files. Unnecessary file coping shall be avoided (i.e. moving to transcoding system, to manual or automatic QC)
  - To create proxy files in parallel to the ingest process/transcoding or ingest HiRes and LowRes simultaneously if available (i.e. from camera). Any relevant metadata (optionally) available from the acquisition process, e.g. EDLs, shall be preserved through the ingest process.
  - to handle priorities
- The system must be able for base band ingest:
  - make incoming (still in transmission) content available ("edit while record")
  - create proxy files in parallel to recording
- The system may be able for base band ingest:
  - to loop record live video signals in minimum 96 hours loop length
  - make loop content browse-able and searchable
  - allow users to select the loop content from "Now" to any time in the past (included in the loop length) and create a new file with this selected content
  - allow scheduling functionality for recording of live feeds
  - allow "teaming" of record channels for simultaneous recording of multiple signals

3.4.6 Material Exchange

Material Exchange defines requirements for both, the Exchange Processes, and the underlying Exchange Systems.

Requirements for Exchange Processes:

- The processes shall allow for exchange/import of new material, but also for updating of material that has been received before. A graphical example of a sample exchange processes is given in the diagram below.
- The import and the updating processes shall maintain consistency over all elements of content, i.e. video, audio and metadata.
- Exchange processes shall support pull and push modes.



All incoming stories are checked. One of the checks is if it's a new story, or a story we already have. If the story is a new one, then it is saved. If it's a story already saved, then using the ID reference the story is updated. A part of the checks before updating is the version check. This can be a manual check. The new, maybe edited, version is then saved as the story.

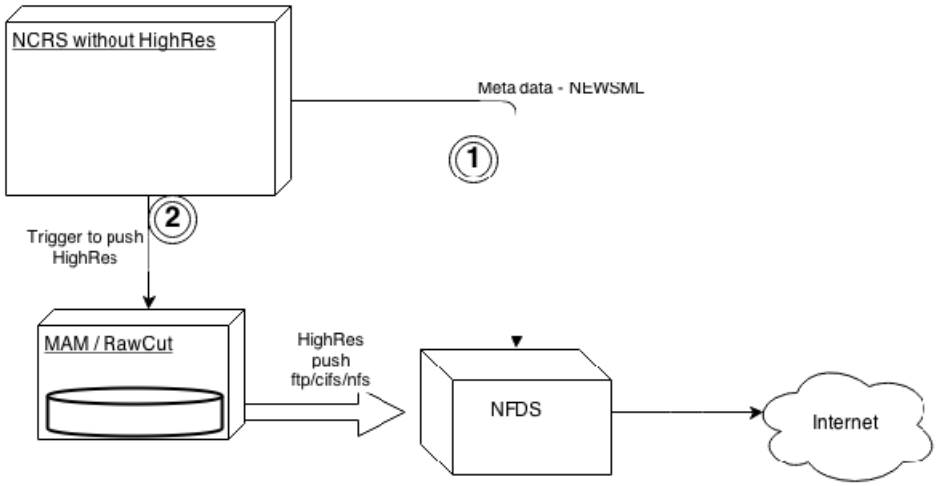
Requirements for underlying Exchange Systems:

- What: A simple way to export and import Content (Video, Audio, Metadata) from a Newsroom (MAM) System.
- Why: to have a simple and transparent way for journalists to exchange content with colleagues on other news rooms.
- How: Keep it simple and smart, by means of standard interoperability functions (for example CIFS, NFS, FTP) between different operating systems.

  For example:

- Moving media files from the production server to the delivery system
- Exchange and interpretation of NewsML 2.7 (or higher) and EBUcore or other frameworks

Example 1
Outgest from an NCRS without build in MAM



NFDS = Network File Delivery System

- Example Procedure: If descriptive Metadata exists, the Metadata set must always be exported before the Media asset itself.

Annex A* (informative) provides a practical example of an exchange system.

3.4.7 Metadata extraction, analysis systems

In an INRS, information about the content is required for retrieval and processing of assets in automated workflows. If this metadata (mainly descriptive metadata such as annotations, but also technical metadata) is not available at a given point in the workflows (e.g. after ingestion of content into a MAM or CMS), tools for automatic metadata extraction (AME) can create this information automatically or support the creation of this information in a semi-automatic manner.

For example, audio-visual analysis can help to segment or categorise content, to detect objects, or Optical Character Recognition (OCR) can recognise text in video. Based on audio-visual descriptors from this process and textual data, semantic analysis can help to improve the accuracy of these tools and to further enrich available descriptive metadata for retrieval using Semantic Web technologies. Other tools, e.g. QC systems, can inspect essence to provide technical metadata required for correct processing in automated workflows.

1. Tools for AME should support different types of media, i.e. audio, visual (video and still image) and textual essence.

2. Tools for AME should support the media formats used in the INRS to avoid additional transcoding.

3. The metadata output of the AME tools should be in the format used in the INRS. Else, it shall be in a format interpretable by other systems in the INRS that use this data (e.g. CMS, dedicated search engines etc.).

4. The performance of the AME tools shall match the time constraints given in news production workflows as to not slow down this process.

* This Annex will either be added in a revision of this document, or will be contained in future supplements to this document.

4. Example Diagrams – Common reference architecture model

An Integrated Newsroom System (INRS) solution is by nature a system environment, where a lot of input and output sources are connected to and where data exchange is a most vital functionality. In the phases of process analysis, system analysis in current operations, specification and design of new systems, a System Context Diagram (SCD) is a very helpful tool to systematically describe the information flow and interactivity between the solution and its environment.

The System Context Diagram is used in Systems design to analyze and characterize such information flows that are entering or leaving a newly to be defined system. The information flow typically is triggered by a business event or triggers a business event.

Each information flow in a SCD thus has a description. Each endpoint identifies the respective business event. The information flow is identified as synchronous or asynchronous. Also manual and automatic actions can be differentiated. It is also possible to distinguish between normal operation and failure state or emergency operation.

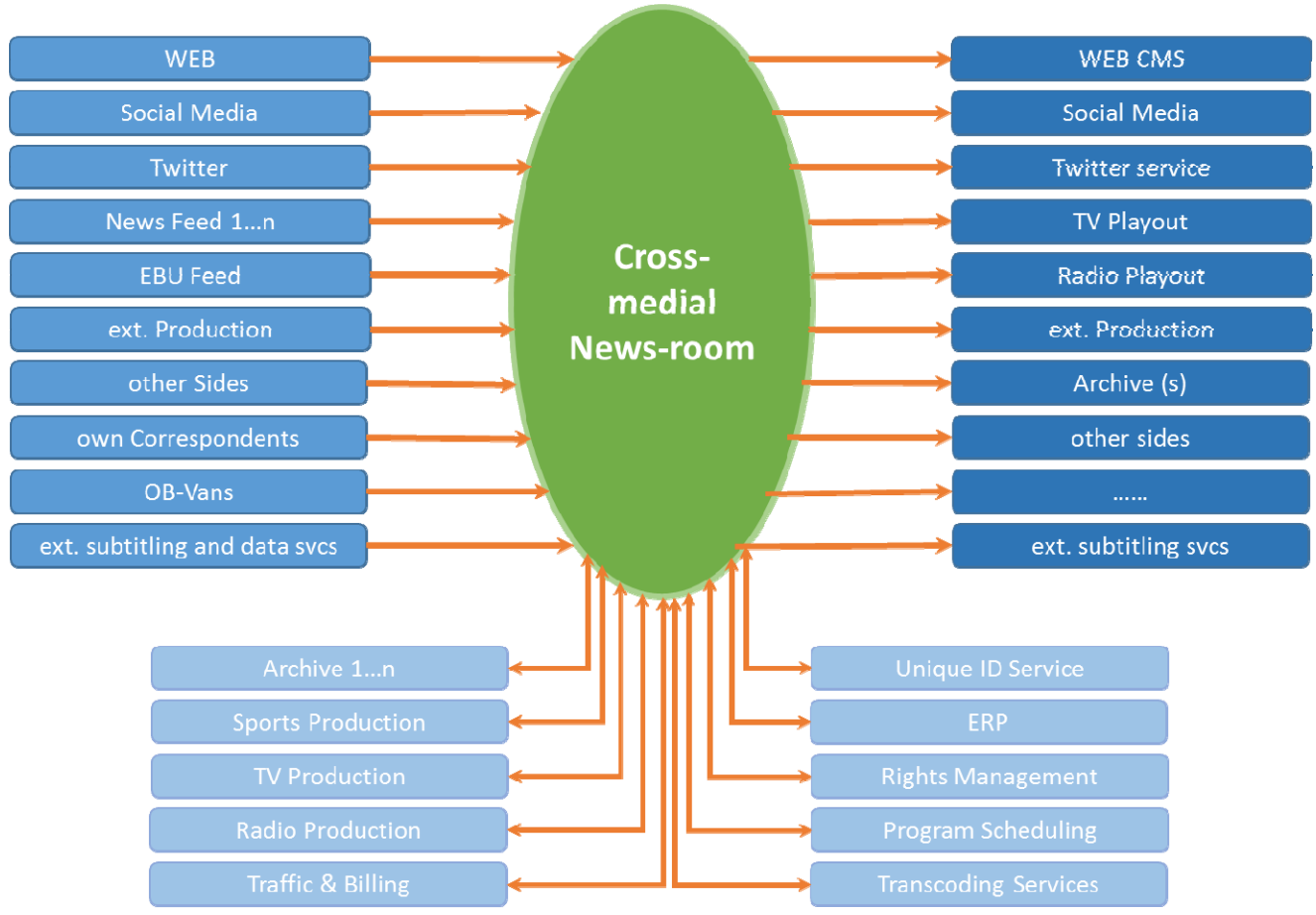
Two examples for SCDs are included.

A good description and examples are given in Wikipedia at:

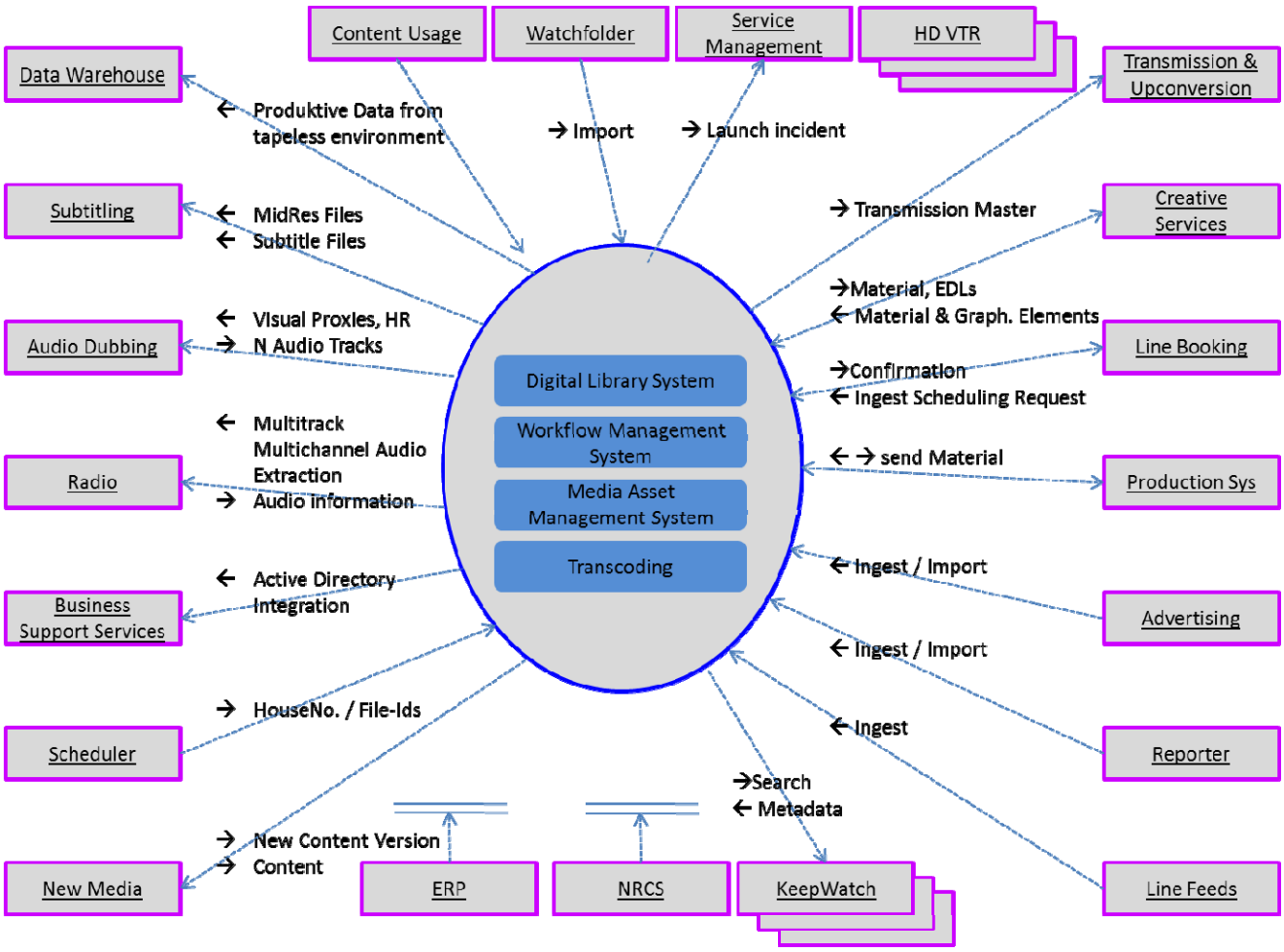
http://en.wikipedia.org/wiki/System_context_diagram

"A System Context Diagram (SCD) in software engineering and systems engineering is a diagram that defines the boundary between the system, or part of a system, and its environment, showing the entities that interact with it. This diagram is a high level view of a system. It is similar to a block diagram.

System Context Diagrams are used early in a project to get agreement on the scope under investigation. Context diagrams are typically included in a requirements document. These diagrams must be read by all project stakeholders and thus should be written in plain language, so the stakeholders can understand items within the document."



SCD Example 1: simple System Context Diagram



SCD Example 2: more detailed System Context Diagram

Annex A* (informative) provides a practical example of an exchange system.

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