	Exemplar identifier	Summary
URN Uniform Resource Name	urn:isbn:0451450523	Introduced in 1994, formalized in 1997 and is now an IETF standard. No central governance, no central resolving infrastructure. Used by major national libraries in Europe. ISBNs for books are part of the URN system. No license costs involved for assigning URNs, but a URN registration agency needs to establish an assigning and a resolving infrastructure. The biggest initiative to harmonize URN registration in Europe is currently undertaken by the PersID project.
ARK Archival Resource Key	ark:/13030/tf5p30086k	Introduced in 1995. Not a formal standard but all ARKs follow the same structure and workflows. No central resolver - organisations can sign up to become Name Assigning Authority Numbers (NAANs) and run their own resolution infrastructure for ARKs. System is run by the California Digital Library with dozens of NAANs worldwide through a combined ARK/DOI infrastructure EZID.
Handle	hdl:2381/12775	Non-commercial decentralized identifier resolution system, established in 1995. Operated by CNRI. Used by many other higher-level systems, e.g. DOI. A non-commercial Handle system that is operated by the Corporation for National Research Initiatives (CNRI) Different initiatives use commercial handle licenses to establish local handle system, such as the European Persistent Identifier Consortium (EPIC). Many existing content management systems, including institutional repositories, currently operate their own local handle system.
DOI Digital Object Identifier	doi:10.1186/2041-1480-3-9	Combines a metadata model with the Handle system as the resolution infrastructure (i.e. DOIs are handles). First introduced in 1998 with the funding of the International DOI foundation (IDF). Became official ISO standard in 2012 (ISO 26324). The DOI system is built upon CNRI Handles. DOI Registration agencies are responsible for assigning identifiers. They each have their own commercial or non-commercial business model for supporting the associated costs. The DOI system itself is maintained and advanced by the IDF, itself controlled by its registration agency members. Using the Handle system, there is a central free worldwide resolving mechanism for DOI names. DOI names from any registration agency can be resolved worldwide in every handle server; DOIs therefore are self-sufficient and their resolution does not depend on a single agency. A standard metadata kernel is defined for every DOI name. Assigning DOI names involves the payment of a license fee but their resolution is free.