Archaeological Digital Narratives:
The Case of Urkesh Ceramics

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1. The Concept of Digital Narrative

The concept of digital narrative is generally associated with the electronic dimension of a text, typically a PDF file. Conceptually, this does not differ from a printed narrative, except for two elements: its searchability and the presence of hyperlinks. There is also, of course, the eminent portability of such files (they can be copied at will); the economic angle (they can be transferred and copied at no cost); the ease of production (they offer the best avenue for desktop publishing); the flexibility of input (neither the size of the file nor the presence of color constitute a problem). But these are practical aspects of the issue, and here we wish to stress the intellectual dimension.

Seen in this light, i.e., with regard to how a digital narrative can impact our ability to develop an analytical argument and relating it to the data, a PDF file adds relatively little to its printed equivalent, hyperlinks being one on the most notable improvements. But in a PDF file they remain at the informational and anecdotal level: they supplement the narrative in an *ad hoc* fashion, and are not an integral part of the argument. The digital narrative we wish to illustrate here aims, instead, at producing a higher degree of digitality, one which adds an intellectual dimension that distinguishes it from a printed narrative not only technically (its electronic embodiment) but also conceptually (a properly digital construct). We will argue this case in the conclusions, after we first give a set of concrete examples drawn from our work with the data from the excavations at Tell Mozan, ancient Urkesh.

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The beginning of our engagement with this topic was with our excavations in Syria, first at Terqa, then at Urkesh. Thus our joint effort dates back to 1978, when we brought to Terqa the first computer to be used on an archaeological project in the region, and one can well imagine how "portable" such a computer actually was.... The confrontation with the ever changing domain of information technology has been a source of constant reflection on what digitality really is, on the conceptual level. And Syria was always an ideal theater for such constant expansion of techniques and corresponding methods, with a total openness on the part of colleagues and authorities (it was always our good fortune that the intellectual dimension invariably came first when visiting the Directorate General of Antiquities and Museums, as well as the Ministry of Culture).

It is in this light that we are delighted to offer these lines to Karin Bartl. Our reciprocal collegiality was rooted in Syria, when she always graciously afforded us the privilege of taking full advantage of the facilities (both logistic and intellectual) of the German Archaeological Institute in Damascus, then under her directorship.

2. Preliminaries

2.1 The Corpus and its Utilization

The ceramic corpus of the Urkesh excavations includes a total of approximately a million between sherds and whole vessels. Fig. 1 gives the totals for excavations units relating primarily to the Palace and the Temple Terrace with its Plaza: this particular portion of the corpus includes a third of a million sherds without considering whole vessels. Elsewhere, we have published similar tabulations of large subsets of the corpus.[2] The factor of size is significant for three major substantive reasons (see also below, Section 5.2).

(1) For *every single one* of the vessels and sherds analyzed in this very extensive corpus, we have the same archaeological biography as the one presented below in Section 4.1. This analytical categorization of each item (vessel or sherd) is tightly integrated within a narrative system which it is the purpose of this article to illustrate. In other words, the great amount of detail associated with every single element in the corpus is instantly accessible in its entirety at any given moment as one may want to buttress a broader line of argument developed by the narrative.

(2) The size of a corpus has direct relevance in reducing to a minimum the anchoring bias that derives from sampling a very limited database. In point of fact, it is not only, or not so much, the numerical quantity as such that matters, but the fact that the *totality* of the material retrieved is accounted for. It is in this regard that the anchoring bias is in fact eliminated, at least as far the archaeologists' observational itinerary is concerned. The inevitable potential bias that remains is that of the depositional process, which filtered the material in ways on which we have no control.

(3) Obviously, large databases that include a highly detailed attribute system for each element are no novelty, and they do rely on an intellectually complex structural approach, namely, the establishment of a categorization system that sets

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[2] See Buccellati – Kelly-Buccellati 2000, 167–183; Buccellati – Kelly-Buccellati 2008.
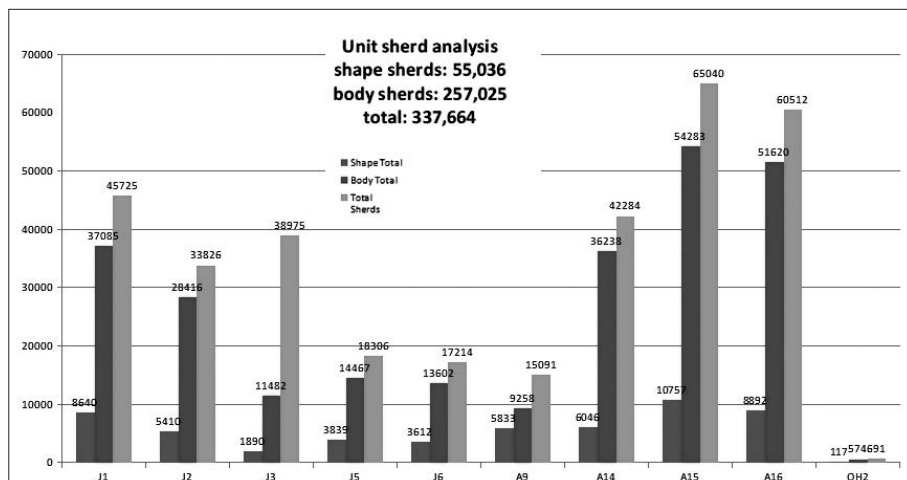
Fig. 1   Total sherds from selected units connected with the Palace and the Temple Terrace. The labels at the bottom refer to individual excavation units, as given in www. urkesh.org.

up a matrix within which each component has to fit, broken down into a detailed attribute system. But data bases remain static: they do not, as such, develop an argument, they can only be queried in order to answer specific questions. The kind of narratives that are embedded in the Urkesh Global Record (UGR) aim, instead, *to develop dynamically just such an argument* in a digital fashion. The reason why the size of the corpus matters is that the argument grows out of the multiplicity of the data, taking all of them into account at the same time. What is important is the interaction between the size of the underlying corpus and the effectiveness of the analysis that builds on it. The special conceptual and methodological relevance of our approach lies in making it possible to insert within an all-encompassing argument not only every last bit of information, down to it smallest "atom," but also other arguments that are developed in parallel tracks.

For this, the physical archaeological record provides the perfect fit. Taken together, there are literally millions of bits that are observed over the course of an excavation, originating in a variety of settings (emplacement, deposition, typology, etc.) and couched in a variety of different standards (verbal, metric, graphic, etc.). How do they cohere in the referential archaeological record, i.e., the logical construct that is derived from the excavated material – this is what is at stake. Can there be a blending – not *ad hoc*, but reciprocal and integrated – of argument and database within a single narrative?

2.2 Uni- and Multi-Linearity

To give an answer, we should consider two different aspects of linearity. Clearly, every argument is linear, but this linearity can unfold on either a single track, or on multiple tracks. Fig. 2 gives a schematic rendering of the two alternatives.

A uni-linear narrative unfolds along a single track (A), going sequentially through points a, b, c, etc. In a paper edition, footnotes (as well as appendices and excursuses) provide collateral information, which does not condition the flow
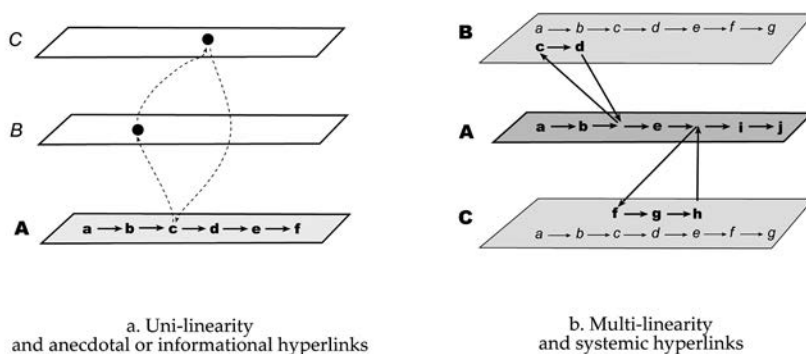
a. Uni-linearity
and anecdotal or informational hyperlinks

b. Multi-linearity
and systemic hyperlinks

Fig. 2   Schematic rendering of uni-linear and multi-linear uses of hyperlinks. The first type (a) applies to non-systemic, and the second (b) to systemic, digital narratives.

of the argument itself. In a PDF version, a hyperlink serves the same function: it is then an anecdotal or informational link, which does take you to a different track (B, C), but without relying on the structural whole that is behind each of the parallel tracks. In other words, the information stands by itself, and the rest of the argument within which this information is embedded is not directly relevant for the understanding of the information culled from it, and it is not assumed that the reader should necessarily follow it in order to have full control of the argument.

In a multi-linear argument, on the other hand, the main track (A) deliberately embeds one or more portions of a parallel track into its own argument, and does so systemically, i.e., with an explicit awareness of the structure of the parallel track, and presupposing this structure. Thus, in the main track or register (A), points c–d are necessarily derived from track B, and points f–h from track C – in other words, the argument of A is not full and complete without the insertion of the segments from B and C, and these segments in turn can only be understood in the full context of the their respective tracks.

It must be noted that the multi-linear dimension is, conceptually, independent of digitality. We may point to two instances of such conceptual multi-linearity.

In a printed book, an illustration may be set apart from the flow of the argument, say as a plate at the end of the publication. But it is an integral part of the argument, and the two (prose and graphics) depend on each other. This interaction is made clearer, and easier to follow, when the drawing or photograph is embedded in the text instead of being relegated to the end.

On a different plane, we may say that any thoughtful reading of a text is in its essence multi-linear. When we study a text (as opposed to just skimming through it), we follow the track proposed by the author, but at the same time we let parallel tracks unfold in our own mind, through which we continuously test the primary track proposed to us. The essence of critical thought lies precisely in this: being able to propose links with tracks not envisioned by the author, tracks that are pertinent and expand or contradict the original argument.

What a systemic digital narrative does is to construe the tracks concurrently: it is analogous to the embedding of an illustration in the text, but with a complexity that is practically unlimited.

2.3 Hyperlinks

The specific characteristic of a digital text is that, while built in a standard uni-linear mode, it carries with it dynamic cross-references in the form of hyperlinks. As we all know, there is a source and a target to a hyperlink. The source is the linking text, i.e., the one that contains the hyperlink. The target is the linked text, i.e., the one to which the hyperlink refers.

Hyperlinks are dynamic because, starting from the linking text, one can get immediate access to the linked text as a whole or to a given subsection of it. In other words, the target is not embedded in the source and can even change without modifying the source. Hyperlinks differ substantially from a footnote precisely because of their dynamic nature. A reference in a footnote is static because the document to which it refers is not embedded in the narrative. The contrary is true of a hyperlink: the linked narrative is dynamically embedded in the linking narrative, because it is fully accessible in its entirety. The two texts (linking and linked) run on concurrent tracks, and are constructed with such concurrency systemically envisioned from the start.

While hyperlinks are always dynamic, in the sense just stated, they serve two very different functions depending on the type of narrative in which they appear, depending, that is, on the degree to which there is a systemic dimension involved.

3. Digital Narratives

3.1 The Concept

A digital narrative unfolds linearly and concurrently. It is linear, because it proposes an argument and develops it sequentially. But it runs concurrently with other linear arguments, to which it refers with dynamic links (to either the full arguments or to segments thereof). It is in this regard that it differs substantially from a non-digital narrative.

Yet, within this understanding of a digital narrative we must in turn distinguish two substantially different types. In one case, the concurrency is systemic, in the other it is not.

A systemic concurrency obtains when it is so conceived by the author and so presupposed by the reader. The parallel tracks are designed to be concurrent, so that a segment of a concurrent track (B, C, ...) is required for the argument in the main track to retain its full force. Conversely, each track can become a primary track (A), with the other being concurrent with it. It is in this sense that multi-linearity is systemic.

It is clear, then, what a non-systemic concurrency entails. The parallel tracks are not *constructed* as concurrent, i.e., they are neither so conceived by the author nor so presupposed by the reader. A non-systemic digital narrative remains essentially uni-linear, because the hyperlinks to the parallel tracks are only informational. The element of multi-linearity is only apparent or virtual since the individual tracks are not to be read concurrently in their structural integrity. Each track has its own structure, which remain independent of that of the other tracks.

This does not mean that, even in the case of a non-systemic concurrency, the tracks do not have their own internal structural integrity. They obviously do: it is the reciprocal interlacing that is not structural. A good example drawn from the

world of printed books would occur when looking up a word in a paper diction-
ary: the dictionary has obviously its structure, however simple – the alphabetical
progression. Thus checking a word would be informational and would in no way
establish a systemic correlation between the structure of the argument developed
in the main track and the dictionary as a secondary track.

Conceptually, the systemic digital narrative model described above is similar
to that of a relational database model. However, the basic element that is missing
in a database is the development of an argument. It is true that an argument is
implicit in the complex categorization systems on which the database is built,
but it is a latent argument, it does not unfold discursively. It is not "narrational,"
meaning precisely that it does not develop a narrative.

We will present three examples of a fully systemic digital narrative in section 4
below. First, to highlight the difference, we will look at an example of a non-sys-
temic digital narrative.

3.2 A Non-Systemic Digital Narrative

Non-systemic digital narratives, which are only virtually multi-linear and remain
in their substance uni-linear, constitute the overwhelming majority of the digital
narratives we read. In Fig. 3 we show an example. The trajectory we show here
takes place within an organized system (Wikipedia); it can be even more haphaz-
ard (more uni-linear) if it takes place within the much wider system of a search
engine (such as Google or DuckDuckGo).

In this example, when looking up "Urkesh", one may follow a link to "Fourth
millennium" because it might help to elucidate the chronological context within
which one should place Urkesh, and this in turn may take us to "Sumer," which is
still directly pertinent to the initial query (Urkesh). If one then continues to "Pre-
history" arriving eventually at "Lower Paleolithic" one has strayed so far from the
initial subject of interest (Urkesh) that one may even forget why one started out in
this search in the first place.

4. Systemic Digital Narratives
4.1 The Sherd Narrative

The following paragraph is a detailed description of a particular ceramic sherd:

> "A16q262-p79 is a sherd belonging to the ceramic lot A16q262, lo-
> cated in locus k105, which consists of a matrix of soil 3x4 m wide and
> between 15 and 20 cm thick (excavated on July 10, 2001, by Salva-
> tore Viaggio, during his first excavation season at Tell Mozan). This
> ceramic lot was in feature 104, which is an accumulation of a reddish
> brown silty material in structure a9. It belongs to stratum 240AAH
> and phase 6mAAH (as defined on October 10, 2010). – The sherd is of
> the fine chaff ware (FC in our system), as analyzed on July 16, 2001
> by Minna Haapanen, who has a long archaeological experience and
> has worked in Mozan for three seasons."

Reading this in a standard printed site report, one would think that the sherd
in question is deemed to be of great significance, and one would have to look at
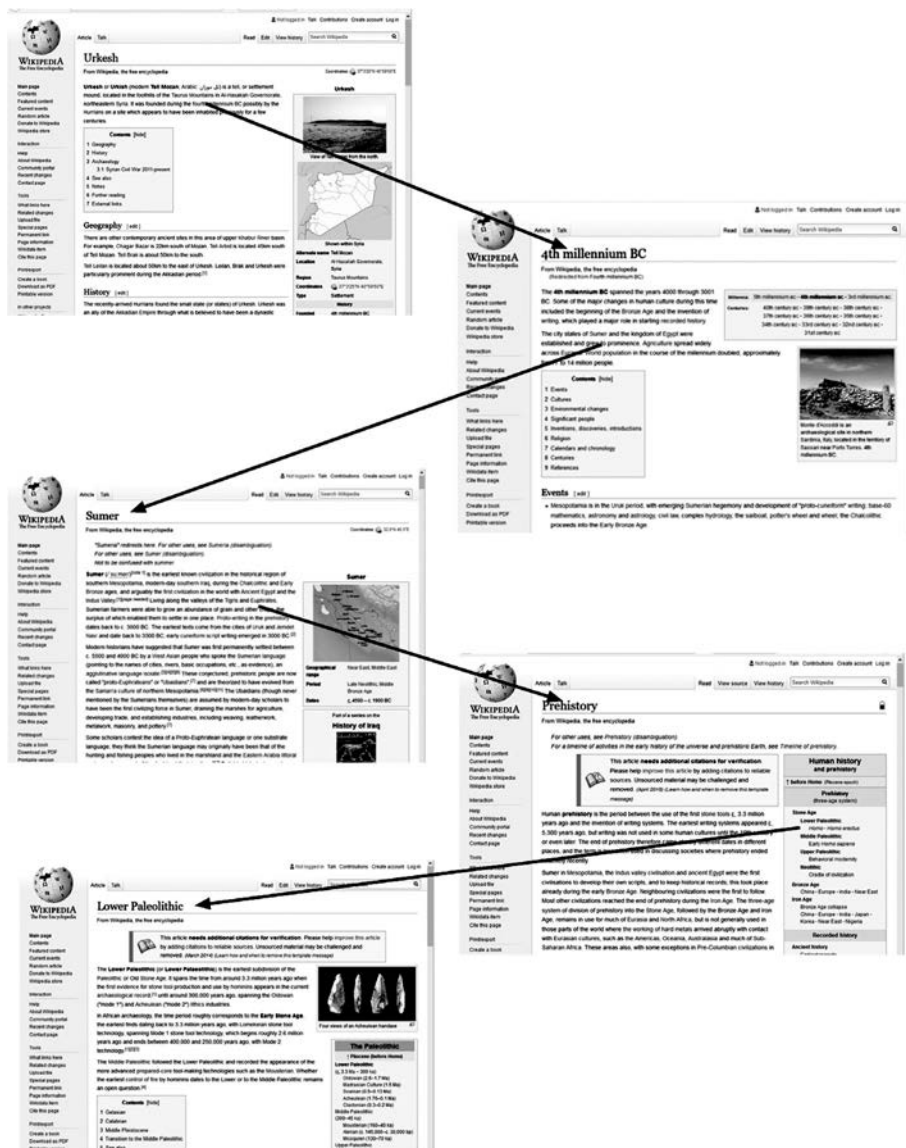
Fig. 3 Example of a non-systemic digital narrative. When browsing, the readers build their own non-systemic narrative, using anecdotal or informational hyperlinks. The narrative is not so intended by any author, in contrast with a systemic narrative.

different pages, or different volumes, if one wanted to double check the items mentioned in the text.

Not so in our case, on either count. First, A16q262-p79 is a most ordinary body sherd from our Urkesh corpus, with no particular stratigraphic or typological significance. And second, "double checking" is immediate, because of the hyperlinks that instantly place each statement in its full context.

What is remarkable is precisely the ordinariness of the item in question.

A16q262-p79 is in fact one of the most common sherds in the whole corpus, a body sherd without any particular diagnostic feature. Why then reserve so much attention to it, as our record does for any other one of the third of a million sherds discussed in this article? We should give a double sided answer. On the one hand, there is the commitment to publish every observation that has ever been made during the excavation process: this is the only objective evidence we as archaeologists can provide, and once the observation had been made, it must be recorded and preserved. On the other, it is imperative that such a "global record" (as we call it) not be a dump where data are essentially irretrievable: hence the format we have chosen, the "narrative" dimension which we are stressing in this article.

In point of fact, the narrative presented above as a prose sequence takes a different shape in the UGR. It is found as an alternative type of prose: a digital narrative embedded in the browser edition of the record. This is illustrated in Fig. 4. Seen in the static dimension of a chart, as given in this figure, the flow of the argument, i.e., the narrative, appears stilted and static. It is in fact meant to be perceived and followed along a very different trajectory than one does when reading a printed text. One can do justice to it only by "reading" the browser digitally, online – in our case, by accessing urkesh.org/A16q262-p79 and then following dynamically the inquiry path as shown in Figures 4 and 5.

It must be noted that the sequential prose text given at the beginning of this paragraph is in fact a minimal "translation" of all that the digital narrative makes possible. For instance, the reference to "fine chaff ware" implies a link to not only a definition to what that means, but also to the entire inventory of fine chaff vessels and sherds within which our A16q262-p79 fits.

Another point needs to be stressed. The "biography" given above contains two very distinct types of information: stratigraphic and typological. In the prose segment as quoted, they are separated by a dash.

The stratigraphic information contained in the first part can never be added to, or changed for that matter: it provides the observational record relating to the moment and the conditions of recovery of the sherd. This is particularly important because the fundamental task of the archaeologist is to document the moment of discovery in all its details, details that must remain as a permanent part of the record.

The second part, on the other hand, contains typological information that is based on the item as such, independently of its original context: these can be added to at will, and within limits also changed, since the item remains available for future inspection and study as part of the storage system that is another essential component of the Urkesh project (although at this point we are keeping only all shape sherds and the most diagnositc of the body sherds, which means in practice that not all the body sherds are individually available but only body sherds representative of any given type are available).

4.2 The Ware Narrative

The sherd narrative we have just seen, the "biography" of a sherd from the moment of its discovery in the field, focuses on a single atom in the universe of data that have been observed and recorded. At the other end of the spectrum, we can look at a clustering approach that brings together data in a comprehensive syn-

thesis according to the higher nodes in the overall categorization system. For example, we could look at the stratigraphic context, i.e., the burial within which the sherd was found (urkesh.org/A16a9). But here we will look, instead, at a higher typological node, the treatment of ceramics within the entire unit A16.

In Fig. 6, the primary track (A) gives the overall presentation of ceramics, at the level of the excavation unit within the larger website (urkesh.org/A16-cer). It is a familiar prose text that one can read sequentially in a uni-linear mode. But several parallel tracks are potentially present at all times, they are presupposed and are accessible in their systemic whole. The text in track (A) refers at one point to "the most prevalent ware," referring to chaff tempered ware (identified by the symbol CH). This statement presupposes two parallel tracks, B and C, which can be accessed by opening the link associated with the statement about the most prevalent ware.

The first track gives substance to the claim about this being "the most prevalent ware." The frequency computations for the ceramics in A16 (track B) gives the precise number (34,171), and the percentage (57%) in relationship to the grand total of ceramic items for A16 (59,834). The links in the lower sector of the right bar takes to each one of the 34,171 elements of the ware in question (Chaff Tempered), for each of which we find a narrative analogous to the one illustrated above in section 4.1.

The second track (C) illustrates in full detail what "Chaff Tempered" means. It takes us outside the A16 excavation unit, to the broader level of ceramic analysis for the entire Urkesh project (urkesh.org/cer), and specifically to the section dedicated to this ware (urkesh.org/cer-CH). Here one will find a detailed verbal description of the ware, plus a number of photos illustrating the outside appearance as well as a section of a number of sherds in this category. For each of these sherds one may, of course, go back to their full individual narrative (or "biography"), analogous to the one given in section 4.1. Fig. 7 represents the same data in a format similar to the one illustrated in Fig. 2.

4.3 The Horizon Narrative

The narratives we have seen so far unfold within a circumscribed dimension, as if chapters in a book – the "archaeological biography" of a single sherd, the typology of a ceramic ware. We turn now to the wider scope of the website as a whole.

With a printed book, we gain an immediate perception of its scope, even as we just leaf through its pages, from cover to cover. We do not have such an immediate perception, instead, when looking at a website. The standard bars at the top and the side of the screen serve as guideposts, but they do not give a full sense of the potential complexity of the website, nor does a site map, however detailed it may be. The ultimate components of the whole, the website pages, remain essentially hidden. Hence it is that we talk about "navigating" a website, or "browsing" through it: they are apt metaphors that render the sense of staying at the surface and looking at adjacencies rather than at the whole picture in its full width and depth.

To gain a wider sense of the whole, we must develop new sensitivities: in the practice of things, we must be able to align the major signposts that correspond to the central topics around which an argument is developed in the website. The notion of inquiry path is useful in this connection: looking for signposts that allow
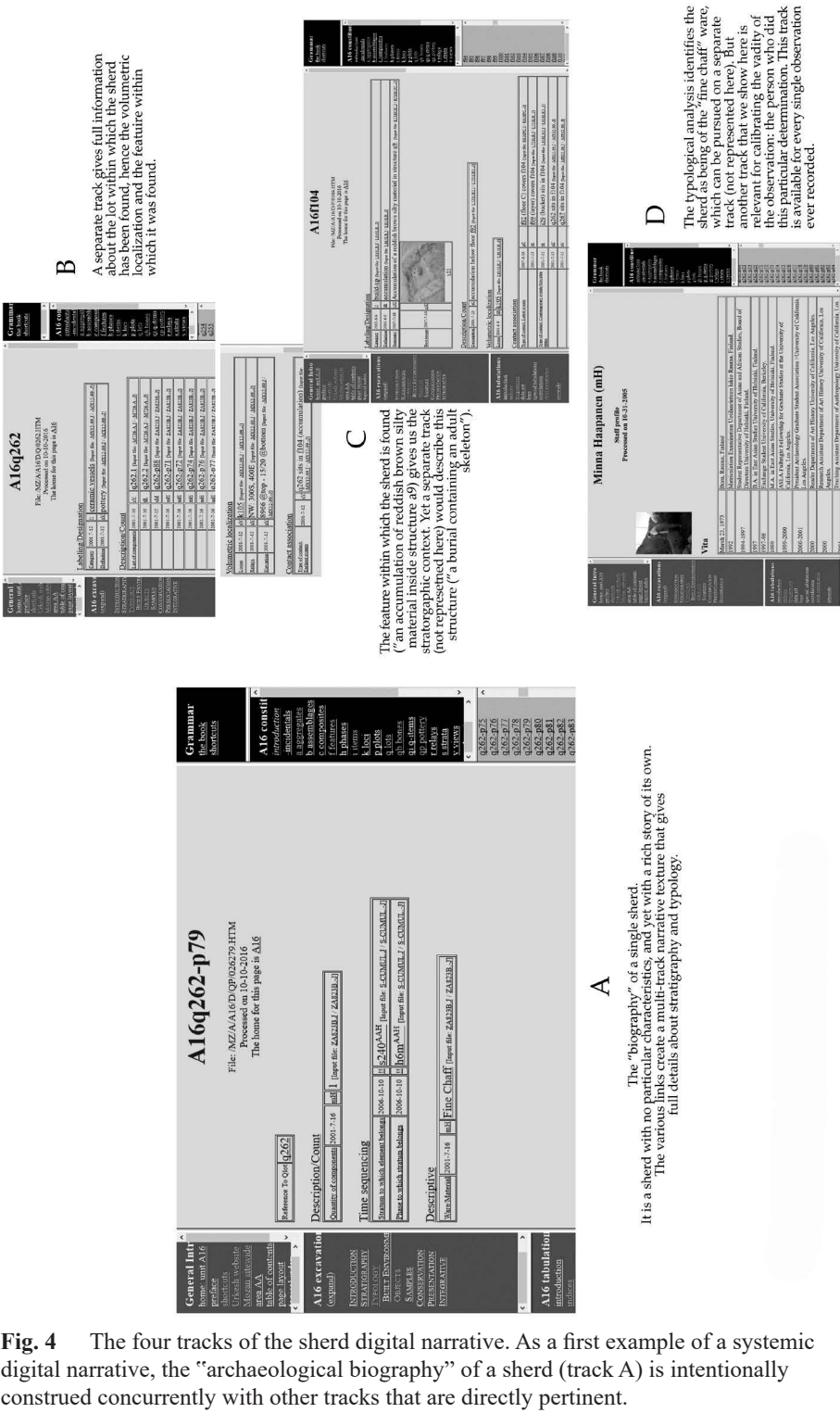
B

A separate track gives full information about the lot within which the sherd has been found, hence the volumetric localization and the feature within which it was found.

C

The feature within which the sherd is found ("an accumulation of reddish brown silty material inside structure a9") gives us the stratorgraphic context. Yet a separate track (not represented here) would describe this structure ("a burial containing an adult skeleton").

D

The typological analysis identifies the sherd as being of the "fine chaff" ware, which can be pursued on a separate track (not represented here). But another track that we show here is relevant for calibrating the vadity of the observation: the person who did this particular determination. This track is available for every single observation ever recorded.

A

The "biography" of a single sherd.
It is a sherd with no particular characteristics, and yet with a rich story of its own.
The various links create a multi-track narrative texture that gives full details about stratigraphy and typology.

Fig. 4   The four tracks of the sherd digital narrative. As a first example of a systemic digital narrative, the "archaeological biography" of a sherd (track A) is intentionally construed concurrently with other tracks that are directly pertinent.
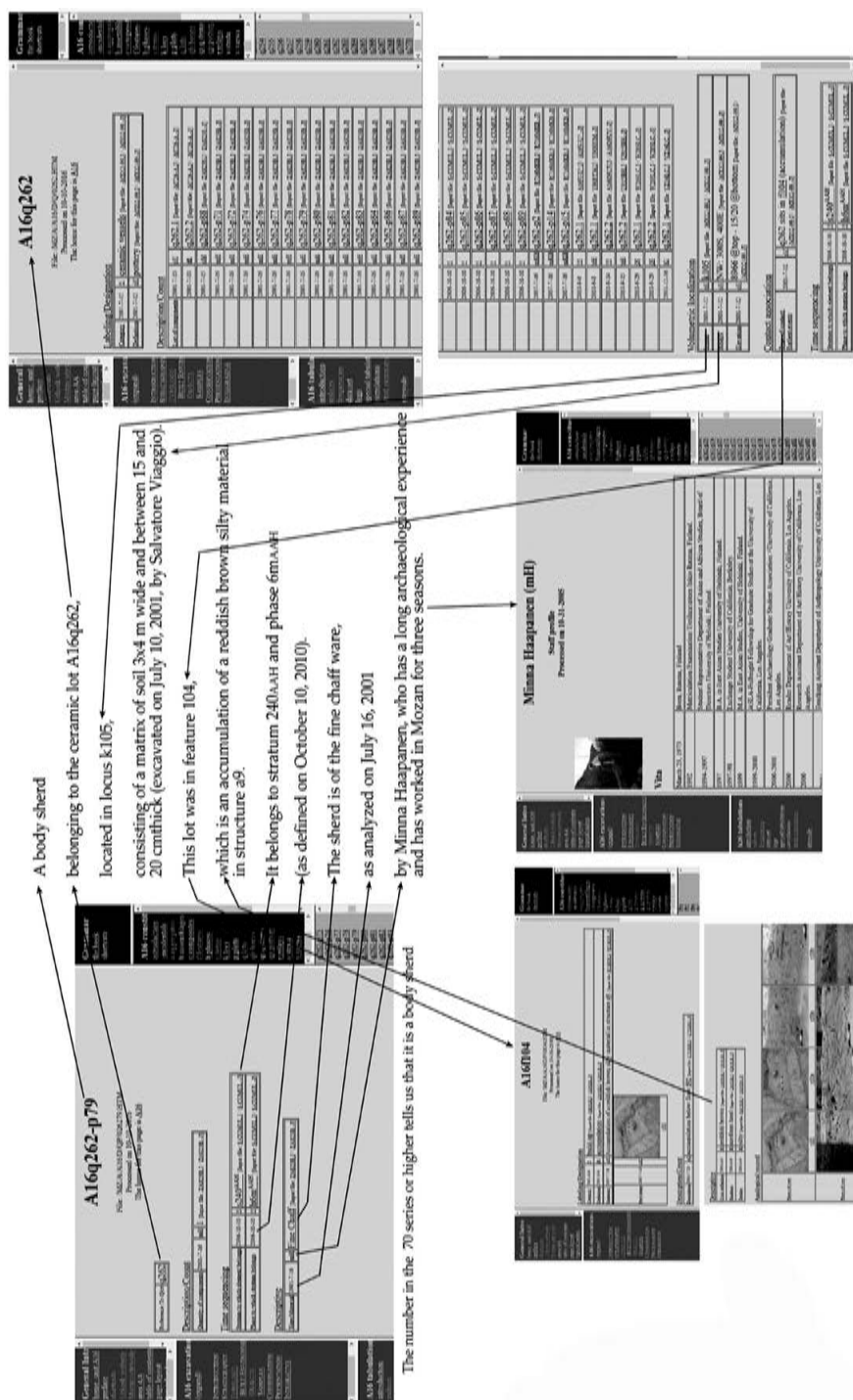
Fig. 5 Translation of a dynamic digital narrative into a static sequential narrative. The complex interlacing among parallel tracks (A through E) corresponds to a sequential narrative in normal prose (F), which remains essentially static.

Fig. 6   The three tracks of the ware digital narrative. Starting from a text in standard prose (A), hyperlinks lead to two (among many) parallel tracks that support the statement in track A.
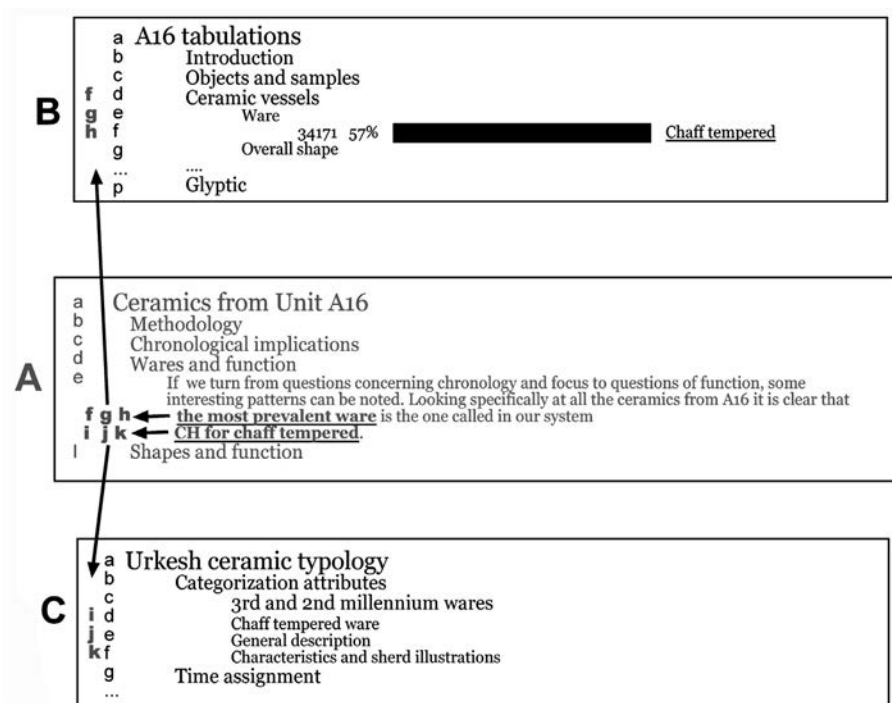
Fig. 7 The three tracks of the ware digital narrative, in text format. The same information as in Fig. 6, but showing how the argument segments of track A are integrated (in a systemic way) with concurrent segments in tracks B and C.

us to pursue a topic without getting lost in tangential detours. We will use as an illustration the topic of temporal horizons (see Fig. 8).

Within the wider framework of the Urkesh website, a first time user would look at Setting > History within the section Overview (see Fig. 8 A). Here in broad brushstrokes one sees the main developmental stages over the two millennia of occupation at the site.

A link takes you then to the page on Horizons within the section Setting, which outlines the chronological sequence, spelling out the major periods that define the historical development of Urkesh (Fig. 8 B), for each of which we then have a description of the archaeology at the site and the sociopolitical and cultural conditions in the region.

Additional links take the reader to two presentations that are technical in nature and are to be seen within the overall framework of the UGR.

The first one is the full *stratigraphic sequence* that serves as a sitewide frame of reference (Fig. 8 C). Here, the full details of the phases and of the strata are given in a one to one correlation with the horizons. With this, we are leaving the discursive mode for one that is tabular in nature: the entire process of strata assignment is here encased in a single frame that accounts for the entire historical development as known from the excavations at a given date. It is not our purpose here to look at how this concept functions, but only to indicate where we arrive at this point in the process of the digital narrative.
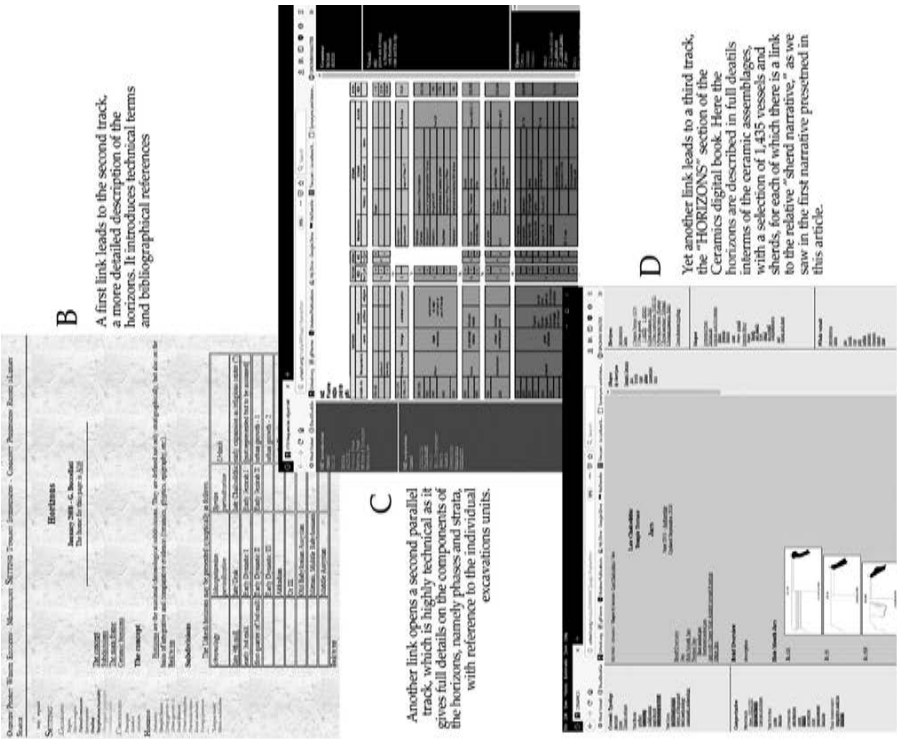
Fig. 8   The four tracks of the horizon digital narrative. This narrative unfolds on the level of the entire website, where the ceramic narrative (Track D) runs concurrently with others from different parts of the Urkesh website.

The second link takes us once more to the *Ceramic digital book*, and specifically to the section devoted to the horizons (Fig. 8 D). The typological distinctiveness of ceramic vessels is a major factor in establishing these horizons in the first place, in close correlation with the stratigraphic data. Here, the narrative begins with an explanation of how the entire section is structured, and from there descends to a chart presentation of the individual periods, for example the Mittani period, where a comprehensive sample of pertinent items is shown (e.g., 132 bowls for this horizon). A drawing is given in the chart for each one of these items, with a link[3] to the sherd narrative (e.g., J3q52-p2), with which we rejoin our initial sherd narrative.

4.4 Types of Narrative Interaction

There are different ways in which tracks interact within any given narrative. Here, we will briefly indicate three types that are found in the examples we have given above.

A digital narrative is *inclusive* because it virtually embeds in itself the multiple tracks which are invoked by the various links. This is clearly indicated in the diagram on Fig. 2b, and then in each of the three examples, where different tracks are included in the primary track as the narrative unfolds.

The *recursive* nature of a narrative refers to the fact that each concurrent or secondary track can become a primary track, with a role switch between tracks. Thus in the ware narrative, each one of the tens of thousands sherds included can in turn become the primary focus in the form of its own A track.

Because of its essentially dynamic structure, each narrative is *progressive*, in the sense that each track invokes others without any practical limitation. This is illustrated especially well by the horizon narrative, which goes from the broader presentation of the chronological sequence to the most detailed and technical argument. This is of course what is particularly striking about a non-systemic digital narrative, where the momentum can become self-driving to the point of losing sight of the direction that the progression takes. In a systemic digital narrative, this is kept in check because of the tight correlation of the tracks.

5. Coda: Behind the Narratives
5.1 The Urkesh Ceramics Universe

The nature of the archaeological record as such is ideally suited to illustrate the full scope of a systemic digital narrative, and a website construed like the Urkesh website seems in turn ideally suited to serve as a case study in this regard. We have shown how three different types of digital narratives can apply to the Urkesh ceramic corpus. In so doing, we have taken for granted that the data are available as structured in a given fashion: they are, in fact, so found in the digital ceramic book of the Urkesh website (urkesh.org/cer).

But what is there upstream of the result, i.e., of the narrative? In other words, how is this narrative generated? We will look briefly at the data (5.2) that consti-

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[3]   In point of fact, a link is available only for those items that belong to a unit that has been completed for publication in the UGR. Links will be added in the measure in which the publication occurs.

tute the initial input, and at the processes (5.3) that operate on these data.

We will then look at two questions that affect more broadly our overall argument. First, the relevance of structure in correlating digital narratives and digital reading (5.4), and, second, the significance of digital thought as implied by both narratives and reading (5.5).

5.2 The Data

The size and especially the nature of the data have a direct relevance for our argument.

We have stressed from the start (section 2.1) what is the relevance of the *quantitative* dimension: being able to control such vast numbers of items is impressive, and is only possible, in the scale to which we are by now used, because of the availability of digital data processing. But the *qualitative* aspect emerges even more clearly if one considers the nature of the data: they are in fact characterized by their profoundly *atomistic nature*, which means primarily three things.

The first is that in spite of the high numbers we retain full control over the precise nature of *each individual minimal constituent*, no matter how "minimal" each one may be. In other words, the sheer size of the items does not obfuscate the precise identification of the "atoms" involved, since they are all defined with a full set of clearly articulated attributes. The example of the sherd analyzed in the first narrative (4.1) is indicative: it is at the lowest rung of a very complex categorization system, and yet it retains its fullest autonomy. What is especially significant is the fact that embedded in its "biography" there is the full set of stratigraphic observations made when the item was uncovered: these observations are primary and irreplaceable, and they remain forever associated with any given "atom."

The second factor that emerges from a consideration of the atomistic nature of the data is the *ease of retrieval*. The narratives that we have illustrated above show how the large size of the corpus does not result in an amorphous mass where the individual pieces are lost. It is the proper nature of a digital narrative to propose parallel conceptual itineraries that show how to move across the vast inventory of data, in function of their systemic definition and organization.

The third factor is the *combinatorial property* of the atoms. It is because of the precise attribute categorization that defines each "atom" that they are, as a whole, open to a variety of dynamic processes that propose correlations with the complete support of a full documentary evidence. It is for this reason that we may consider the archaeological record as "conceptually digital." Even though the data emerge from the ground in a totally unstructured fashion, except for their emplacement, they are then progressively integrated into a meaningful whole, or rather, into a series of meaningful wholes (deposition, typology, function, chronology, social implications, etc.). In practice, these processes are activated through the application of programs, to which we should now turn.

5.3 Processes

The integration of the "atoms" into progressively higher universes (the ceramic corpus, the chronological framework, etc.) is the result of interpretative processes that are brought to bear on these minimal constituents by the archaeologist.

The initial process lies in the recognition of the constituent through an input procedure that may take different forms (verbal, metrical, graphic, etc.). Through this, the constituent is marked not only in its identity, but especially (in an archaeological context) through its contact association with other minimal constituents.

A variety of programs re-assemble each individual constituent within these larger universes, and in so doing they construe multi-layered outputs which are structured from the start as interlocked with each other. It is from this re-structuring that the end result, far from being a dump of undigested data, emerges immediately as a coherent, interpreted whole, or in fact as a set of wholes.

These processes are guided by a structured and systemic design that underpins the entire process, a design which is reflected in the end result, i.e., in our case, the website. The digital narratives we have described are possible only because they can rely on the same design. By pointing to the higher nodes on the one hand and, on the other, to the capillary system that depends on them, the digital narratives unfold on multi-linear tracks allowing the cross-referencing which we have described in detail above.

5.4 A Question of Structure

Digital reading is the correlative of a digital narrative. It requires an awareness of how the narratives are structured, and a readiness to adapt to those structures, which differ from the traditional ones on account of their multi-linearity. A systemic website is in fact one where the narratives are articulated in the manner we have shown: multiple narrative tracks proceed along parallel lines, and presuppose each other. The production of a digital narrative implies the setting up of such multiple parallel tracks, and, conversely, digital reading implies the ability to access these tracks. In other words, the author must aim to create such structures, the reader must expect and then follow these structures.

In this regard, the choice of the terms "narratives" and "reading" is significant. In common parlance, we speak of "visiting" a "site." The platform that makes it possible is a "browser," through which we "navigate" what appears dynamically on the screen. All of these terms are at variance with the notion of providing a sequential and tightly structured argument when composing it, and, when reading and studying it, with the presupposition of a full awareness of its entire sequential import. "Visiting" implies a cursory presence, "browsing" refers to a casual and leisurely approach (in keeping with its etymological origin of feeding on buds and twigs), "navigating" has acquired primarily the meaning of "ambulating" rather than of proceeding carefully on a set course.

What is then essential is the emphasis on the structural dimension of the argument. It is a new structure, one that not only does not exist, but is in fact impossible, in a non-digital context. We can achieve here a qualitative leap in developing a logical argument. It is a leap on a par with what writing first made possible, some five millennia ago. As the physical extraposition of logical brain functions, writing provided a whole new embodiment for the articulation of an argument: it was not only a matter of replacing memory; more significantly, it gave a reader a substantially different perception of the logical flow, i.e., a visual perception. But it was a static perception: parallel tracks had to be developed in the mind of the reader. What a digital narrative adds, is, as we have seen in detail, the concurrency of multiple tracks.

5.5 Digital Thought

We may regard a digital narrative as the logical culmination of the historical development towards a progressively ever greater degree of control over nature: just as language had given a somatic, and writing an extra-somatic, expression to the logical flow of an argument, so the digital dimension introduces a new dynamic element in this process. Spoken and written arguments are, in fact, static, whereas a digital argument is intrinsically dynamic. The concept of digital narratives, and the interlacing that occurs among them, is an important aspect of this process.

We can use the term "digital thought" to refer to the human intellectual posture in writing and reading digital narratives. As we have argued, and have here shown to be concretely possible with regard to the Urkesh ceramic universe, digital thought is applied to narratives that are structurally concurrent, thus creating a systemic interlacing. It is a special form of cybernetics, a "piloting" not only of information, but also of the arguments that are interlaced with, and build on, each other.

The "governance" of the process remains in the hands of the human "pilot" (the *kybernētēs*). We still have a fully "human" intellectual posture. It is thus opposed to artificial intelligence, on which, however, it can shed light. In one respect, artificial intelligence may in fact be considered as a mechanism that automatically connects digital narratives, seen in their systemic and parallel dimension. With digital thought, on the other hand, it is the human "pilot" who controls the reciprocal flow of the arguments

Thus, the notion of digital narratives opens up a new perspective. Defining the structural whole that these narratives constitute helps us to better understand a critical dimension of our new intellectual world. And while it extends obviously well beyond the field of archaeology, it is an area where the data as recovered in the excavations lend themselves paradigmatically to define it. The examples we have given from Urkesh are of course even more circumscribed, but will serve to show concretely what is meant, especially when seen within the framework of the wider Urkesh website.

Bibliographical Note

The theory behind the approach described here is presented in detail in: *G. Buccellati, A Critique of Archaeological Reason. Structural, Digital and Philosophical Aspects of the Archaeological Record* (Cambridge 2017). The website *www. critique-of-AR.net* serves as a companion to this volume, and it implements some of the aspects of the digital narrative presented in this article.

The theory has been applied within the digital record of the Urkesh excavations, presented in full in www.urkesh.org. The Ceramics digital book (urkesh. org/cer) contains the synthetic data relating to the ceramic corpus, while individual books contain the details for each excavation unit: the ones that have been used as examples for this article are in the book urkesh.org/A16. We have discussed elsewhere various aspects of the system, see in particular:

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forthc.*The Urkesh Mittani Horizon: Ceramic Evidence*.

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[4]   In this 2008 article, which gives an explanation of the Urkesh digital record, the statistics for unit A16 are somewhat different from the ones given in the present article: here the ceramics analysis has been edited and the totals revised.

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Illustration on the cover: Vault ornament in stucco from Qaṣr al-'Aẓm in Hama/ Syria (K. Bartl, A. Farzat, Qaṣr al-'Aẓm. Ein osmanischer Gouverneurspalast in Hama. Baugeschichte und historischer Kontext, Damaszener Forschungen 15, 2012, 79, Abb. 105); drawing by Andrea Gubisch.

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Karin Bartl, Rouj Basin, Syria 2006
(photo: D. Rokitta-Krumnow)

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