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Re: Comment on EPCglobal Framework Architecture

Dear Mr. Frey,

This letter is for the purpose of offering comments on the EPCglobal Architecture Framework 1.2 (hereinafter EPCglobal Architecture) as approved September 10, 2007.

Summary of Comment

EPCglobal has established ground-breaking standards for tracking EPC identified ***physical*** products, and capturing very granular event information about those physical products, across and within enterprise systems controlled by large organizations. EPCglobal has likewise formulated standards relative to the sharing of electronic pedigree documentation for use by pharmaceutical supply chain participants, though it has yet to include these standards within the current EPCglobal Architecture. This comment proposes means for adding momentum to EPCglobal's visionary and well-vetted architectural framework efforts. These means would provide large organizations, and, in addition, small businesses, individual supply chain participants and even consumers, with the affordable ability to independently author, track, control and discover granularly identified ***informational*** products. The attribution of permission controls, granularly made by information producers themselves to each automatically or manually authored informational product, is the fulcrum point upon which this comment is balanced and presented.

Introduction to Pardalis, Inc.

Introducing Common Point Authoring (CPA)

Pardalis' object-oriented authoring methods provide information producers along multi-party supply chains with the ability to granularly and independently track and control their uniquely identified informational products one-step, two-steps, three-steps, etc. in either a trace forward or trace back context. This also means that information producers, even at the extreme ends of complex supply chains, can now discover each other (without prior business arrangements) to trade trustworthy, traceable information. We call the architectured system for accomplishing this kind of authoring, tracking, control and discovery the Common Point Authoring system (hereinafter CPA).

CPA: Chemical Industry Roots

The methods for developing CPA were first envisioned in regards to transforming paper-based (or scanned) material safety data sheets (MSDSs) in the chemical industry into market-driven, electronic commerce profit centers for chemical manufacturers and importers. You may think of paper-based MSDSs as a type of 'pedigree document' for chemicals manufactured and traded down a multi-party supply chain. We recognized that the need for increasing electronic information flow between the multiple segments of chemical industry supply chains could be met with globally accessible software services. We further recognized that global software services must first address 'fear factors' revolving around data ownership.

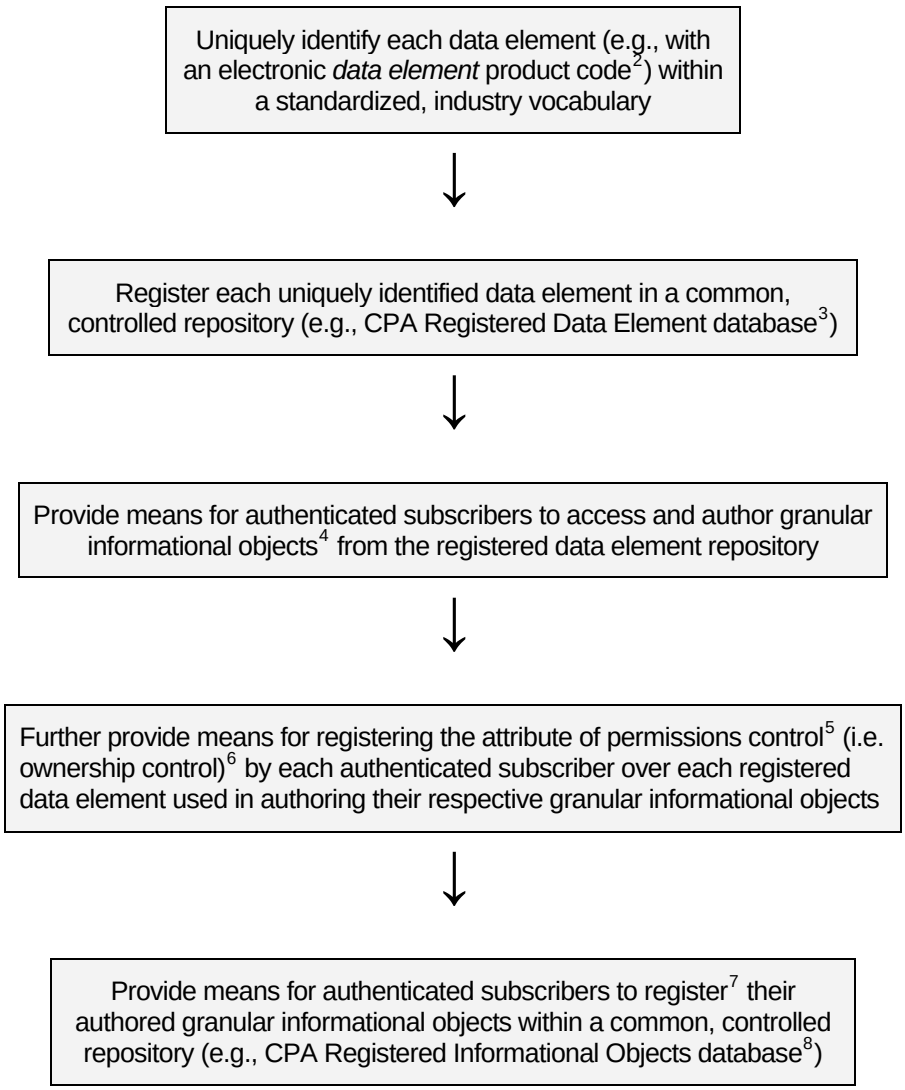
CPA: Synopsis of Essential Methods

CPA is designed for granularly authoring, tracking, controlling and discovering informational objects with, for instance, only one of the data elements contained within that object being the electronic product code (EPC) of a physical product. That is, to use the parlance of EPCglobal, within CPA every data element[1] made available for authoring has itself its own

[1] See the definition of 'Data Element' in Exhibit A.

electronic *data element* product code. But there is more to CPA's methods than the unique, granular identification of data elements.

Illustrative Embodiment of CPA's Essential Methods



[2] See footnote 12, below, and accompanying text.
[3] See 'CPA Reg. Data Elements DB' in Exhibit D.
[4] See the definition of 'Informational Object' in Exhibit A.
[5] See the definition of 'Permissions' in Exhibit A.
[6] See the definition of 'Owner' in Exhibit A.
[7] See the definition of 'Registered Informational Object' in Exhibit A.
[8] See 'CPA Reg. Info. Objects DB' in Exhibit D.

CPA SaaS Deployments and Adoptions
(2005 – Present)

It is my understanding that the procedural stage for developing Discovery Services is presently with the Data Discovery Joint Requirements Group, and that this group is first focusing on end-users' needs. I am also aware that GS1 EPCglobal has an interest in the tracking of uniquely identified livestock for the protection of public health as represented on the DiscoverRFID website. The following should help to frame the practical application of CPA, from an end-user's perspective, to not just the livestock industry but multi-party supply chains in general.

Deployment within Texas Livestock Auction Market Project

From October, 2005 to March, 2006 Pardalis executed a market-driven project revolving around a commercial Texas livestock auction market. Partnering with a third-party vendor providing a RFID collection hardware and software system, Pardalis provided a Common Point Authoring 'data bank' Internet service to the livestock market and to key livestock buyers. Small livestock producers brought their calves into the market for sale where they were first RFID tagged at an affordable price per head. The RFID tags were read, a seller code was entered, and data elements were also entered from each affidavit collected from the sellers as to country of origin (USA) of their respective calves. Buyers bid and paid premium prices (over and above untagged calves) for these RFID tagged and origin-sourced calves. After each sale, and at the speed of commerce, this data was electronically merged with the buyer code information and uploaded into a data bank account 'owned' by the livestock auction business as a trustee for each seller. The livestock owner granularly and efficiently shared data forward to the buyers accounts in the 'data bank'.

What was granularly withheld as confidential data elements were those identifying the sellers themselves. The livestock producers liked that a trusted business entity – the livestock auction business – stood as a trustee between them and governmental regulators in case their calf later turned out to be the next 'mad cow'. The livestock auction business liked the granular ownership control because they did not share their client list to the supply chain, and, particularly to downstream slaughterhouse/packing entities who might try to circumvent their business.

Adoption by CalfAID, a USDA PVP

Fast forwarding to the present, with Congressionally earmarked funding of $1.8M the Dickinson Research Extension Center of North Dakota State University has adopted the same Pardalis 'data bank' (with presentation layer customization) as a software as a service (SaaS) that will be demonstrated to affordably stretch from the smallest livestock producer to the largest packing entity for both the 'trace back' (in the event of another 'mad cow' case) and 'trace forward' (for providing age and source verified information sought by international beef meat markets). This adoption by NDSU is actually an adoption by CalfAID, a USDA process verified marketing program (PVP) for tracking ***RFID tagged calves***, being run as a business out of Dickinson, North Dakota, in conjunction with the North Dakota Beef Cattle Improvement Association.[9]

Adoption within Michigan

A direct 'ripple effect' of CalfAID's adoption of CPA in North Dakota is that the Agriculture Experiment Station at Michigan State University (MAES) is now funding a three-year, $75K project entitled "Enhancing Animal and Public Health: Development of a Transportable Livestock Health Record System". This health record will include veterinary pharmaceutical vaccinations. The project commences this month (January, 2008) for using the same Pardalis 'data bank' (with presentation layer customization) for testing the granular sharing of veterinary information regarding ***RFID tagged dairy calves*** along the dairy supply chain.

Additional 'Ripple Effects'

The Michigan livestock health record project, described above, is larger than it may first appear. The lead investigator of this Michigan project has played an instrumental role in successfully introducing mandatory animal identification to the State of Michigan, which became law in March, 2007. *Michigan is the only state in the United States with a mandatory animal identification system following the mad cow case of late 2003.* The next step for Michigan will be the development of a state-wide USDA PVP, very likely with involvement by CalfAID. In fact NDSU has unilaterally signaled to the MAES

[9] For more information, see the news release, CalfAid Director Testifies to International Trade Commission.

that some portion of the $1.8M in federal grant funds will be used to support Michigan projects involving the lead investigator of the Michigan livestock health record project. *The common thread is CPA.* North Dakota and Michigan understand that by collaborating together to address information sharing along their complex livestock supply chain, they stand the best chance of establishing the national model for livestock animal identification. That's something the USDA failed to formulate following the 2003 'mad cow' case.

Pardalis' Intellectual Property (IP)

Pardalis received issuance from the United States Patent & Trademark Office (USPTO) of its first patent entitled *"Informational object authoring and distribution system"* on December 30, 2003. US Patent #6,671,696. In this parent patent the chemical industry provides the embodiment for illustrating the practical application of these methods.

Pardalis received issuance from the USPTO of its first continuation patent entitled *"Common point authoring system for tracking and authenticating objects in a distribution chain"* on November 14, 2006. US Patent #7,136,869. In this patent the beef livestock industry (containing convergent information sharing issues related to genetics, pharmaceuticals, product safety, product marketability, health records, information producer confidentiality, etc.) provides the embodiment for illustration purposes.

A pending, second continuation patent application entitled the *"Common point authoring system for the complex sharing of hierarchically authored data objects in a distribution chain"* has been published by the USPTO. US Patent Application #20070061360. In this pending patent the beef livestock industry again provides the illustrative embodiment.

Four international patents covering the claims of the 696 patent have been issued (or issuance notices have been received) in Australia, China, Mexico and New Zealand. Similar patents are expected to issue from Brazil, Canada, Europe, Hong Kong, India, and Japan by 2009.

Pardalis' 696 Patent has been distinguished by either USPTO patent examiners, or other international patent office examiners, from three patents held by Microsoft (US Patent #5,511,197, US Patent #5,724,588, US Patent #6,493,719), an IBM patent (US Patent #6,438,560), a SAP AG patent (US Patent #7,225,302), a Xerox patent (US Patent #5,220,657), and others. Xerox's 657 patent is a document collaboration patent while the Microsoft, IBM and SAP AG patents are computer run-time patents.[10]

Initial Contact with GS1 UK

Seeking involvement by Pardalis in a supply chain information project outside of agriculture, I had a phone call shortly before last Thanksgiving with Mark Gillott, a project manager for GS1 in the UK, about a GS1 UK EPCIS pilot for delivering seamless and secure RFID data service.

In discussing whether Pardalis' technology and IP might be applied to this project, Mr. Gillott informed with me that his project will be tracking traditional, though uniquely-identified, physical products whereas Pardalis' object-oriented approach provides supply chain information producers with the ability to granularly and independently track their uniquely identified informational products.

Mark raised the possibility of Pardalis' involvement in setting standards for the yet-to-be-determined Discovery Services and the Discovery Configuration & Initialization to the EPCglobal Architecture.

Commenting on the EPCglobal Architecture

Suggested EPCglobal Architecture (Diagram 1) - Exhibit B

My reading of the current EPCglobal specifications, and my understanding of what the immediate next steps will be, is that the current and future specifications will be strongly rooted in an architecture that is designed to track physical products identified with an EPC code, and that will significantly make more efficient what is already occurring vis-à-vis the sharing of information between enterprise systems. The current architecture diagram represented at Page 37 of the

[10] For further analysis, see footnotes 13 and 14, below, and accompanying text.

EPCglobal Architecture document referenced above (hereinafter the EPCglobal Architecture Diagram) represents a ground-breaking design for capturing granular event information but not (yet) for granularly authoring, tracking, controlling and discovering informational objects, or recognizing the need for granular ownership control over informational objects.

Furthermore, while EPCglobal has begun establishing forward-looking standards relative to electronic pedigree documentation for use by pharmaceutical supply chain participants,[11] it has yet to include these standards within the EPCglobal Architecture Diagram.

With this comment I am proposing, by way of an illustrative example, that the methods developed by Pardalis within its IP may be used to derive essential specifications for connecting the current EPCglobal (EPCIS) Architecture with its ePedigree standards for the pharmaceutical industry. And, furthermore, that this connection could provide the added bonus of drawing together EPCglobal Core Services for Subscriber Authentication, Discovery and the ONS Root as generally reflected in Exhibit B entitled "Suggested EPCglobal Architecture (Diagram 1)". As you can see, this exhibit strongly echoes that of the current EPCglobal Architecture Diagram.

Mock Registered CPA Informational Object Bearing EPCglobal Pedigree Data Elements – Exhibit C

While EPCglobal strives to be technologically neutral in establishing its standards, there is an undeniable emphasis within the EPCglobal Architecture upon protocols for exchanging XML-based messages over computer networks. This is as it should be as XML is a standard messaging format widely adopted by many of the major corporations currently contributing resources to EPCglobal.

I have created an illustrative "Mock Registered CPA Informational Object Bearing EPCglobal Pedigree Data Elements" in Exhibit C which echoes the 'wrapped' pedigree document at Page 22 of the EPCglobal Pedigree Ratified Standard Version 1.0 as of January 5, 2007. In Exhibit C you will see how the wrapped, granular pedigree document of Page 22 has been further granularized with mock XML tagging containing unique identifiers (like electronic data element product codes[12]) for pointing to a Registered Data Element Database. You will also notice that 'Other Data …' is included with the initialPedigree and the shippedPedigree, both having been authored by the Sender. This 'Other Data …' includes Permissions data (see the footnotes in Exhibit C) echoing the kind of restrictive permissions attributed to the identity of sellers by the Texas Livestock Auction Business, as described above. I am not making a comment as to whether SenderInfo or a Sender's signature should be kept confidential regarding an ePedigree document. *I am merely illustrating that the independent assignment of permissions by an information producer to this granularized pedigree informational object represents the fulcrum point upon which this comment is balanced and presented.*

The wrapped pedigree document at Page 22 represents collaborative authoring on a one-way street. By contrast, Exhibit C represents the end-product of authoring *with the choice of collaborating, or not*. Authors (e.g., information producers along multi-party supply chains) draw granular, immutable data elements from a 'common point' of controlled vocabulary to create machine-like informational objects that may then be granularly shared in whole or in part. Furthermore, information producers have the choice after sharing of retaining granular usage control of their informational objects, and granularly tracing the movement of their informational products, no matter how lengthy, complex or fragmented a supply chain may be. In this regard, the distinguishment of Pardalis' IP from that of the Xerox patent[13] identified above is particularly significant. The Xerox 657 patent is a long-standing patent covering collaborative document editing methods where multiple parties share in the authoring of a single document,[14] as essentially represented by EPCglobal's wrapped pedigree document of Page 22.

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[11] See EPCglobal Pedigree Ratified Standard Version 1.0 as of January 5, 2007.

[12] See footnote 2, above, and accompanying text.

[13] Xerox's U.S. Patent #5,220,657 entitled 'Updating local copy of shared data in a collaborative system' (issued June 15, 1993).

[14] Also see and compare, "CrystalWeb – A Distributed Authoring Environment for the World-Wide Web" by R. Peters et al. (April 1995, pages 861-870); "DAPHNE – A Tool for Distributed Authoring and Publishing" by Z. Zhang et al. (October 1999, pages 1-15); and "Collaborative Multimedia Annotation Using A Centralized Document Server", IBM Technical Disclosure Bulletin, IBM Corp., New York, US, Vol. 38, No. 9, September 1995, page 425.

Furthermore, CPA is to document *authoring* as XML is to document *transferring*. But beyond describing them both as built to evolve, object-oriented, extensible, granular, efficient, etc., *CPA was conceived to precisely address information sharing along complex supply chains*. As supply chains lengthen and fragment, their increasing complexity is representative of what may generally be described as a social network. And within social networks the ownership and control of information deemed confidential by each information producer becomes rapidly affected by multiple 'fear factors'. Pardalis has seen evidence of such fear first hand, as described above, in the livestock industry.[15] *Any SaaS that may be provided to the length and breadth of complex supply chains must address the kaleidoscopic political realities of data ownership.*

Suggested EPCglobal Architecture (Diagram 2) – Exhibit D

As with the EPCglobal Architecture, the architecture of the Common Point Authoring system is hierarchical in nature. To provide a more focused echo of the current EPCglobal Architecture Diagram, I have prepared Exhibit D entitled "Suggested EPCglobal Architecture (Diagram 2)". This diagram summarizes under EPCglobal Core Services the combining of hierarchical identifiers for the ONS Root, Manager Number and Subscriber Authentication into a Registered Data Elements database[16]. A Registered Informational Objects database[17] further contains immutable, authored informational objects with discovery permissions designated by the authors. Optionally, a Billing database records all transactional discovery usages for the choice, for example, of compensating information producers for providing discovery access to their respective informational products according to designated permissions. Manager controlled databases for Registered Data Elements and Registered Pedigree Informational Objects are also shown to connote a more distributed architecture.

Concluding Remarks

EPCglobal has taken a leadership role in solving not just the technological issues involved with information sharing along complex supply chains, but solving them in a way that first addresses the concerns of end users. The irony is that while there seems to be 'too much information' to be analyzed as it is, the reality is that there is not enough trustworthy, traceable information being made available to complex supply chains by supply chain participants (be they large organizations, small businesses, individuals or consumers).

The end users currently of interest to EPCglobal are large organizations with enterprise systems positioned along multi-party supply chains. If EPCglobal envisions providing its current end-users with the choice of XML document authoring, *coupled with the informational product ownership*, then Pardalis has methods of critical value to offer. If EPCglobal's Core Services are to be expanded to serve not just the information sharing needs across and between enterprise systems controlled by large organizations, but also that of consumers (at the downstream end) and small businesses (at the upstream and lateral ends), then Pardalis has methods of critical value to offer.

It is my hope that following your review of these comments, you and I will have an opportunity to discuss whether or how Pardalis, Inc. may contribute to the remarkable impetus that is going into building the EPCglobal Architecture. In fact it was suggested to me by Gena Morgan that a meeting with you, Margaret Wasserman and Bryan Tracey might well be in order.

I'll look forward to speaking with you about this comment. Please feel free to respond via my e-mail address, below.

Best regards,

Steven Holcombe, CEO
(405) 334-2300 (cell)
steve@pardalis.com

[15] Also, see generally, *Banking on Granular Information Ownership, A White Paper*.
[16] See footnote 3, above, and accompanying text.
[17] See footnote 8, above, and accompanying text.

Exhibit A

DEFINITIONS

A Data Element is the smallest unit of data in the Common Point Authoring system. A Data Element may be any information and/or any instructions. *A Data Element is immutable and uniquely identified if registered for use with the Common Point Authoring system.*

An Informational Object is comprised of one or more Data Elements, Data Element Sets, or Informational Objects, or any combination thereof. *An Informational Object is immutable and uniquely identified if registered for use with the Common Point Authoring system.* An Informational Object is the largest group of data in the Common Point Authoring system and may be industry specific.

A Registered Informational Object may be composed of one or more Registered Informational Objects, unregistered Informational Objects, unregistered Data Elements, unregistered Data Element Sets, registered Data Elements, registered Data Element Sets, or any combination thereof.

Permissions are attributes associated with either Data Elements or Informational Objects that control access by Subscribers. Permissions may have either a positive or a negative effect. Permissions may be (1) exclusive or non-exclusive, (2) conditional or permanent, and/or (3) limited or unrestricted, or any combination thereof. Following registration of an Informational Object, a Subscriber having permission to access an object may grant, cancel, or modify Permissions for the Informational Object or a Data Element if the action taken does not exceed the authority of the Subscriber and does not violate the grant of a prior Permission.

Owner in the context of a Registered Informational Object means a Subscriber who sets the Permissions for an Informational Object or Data Element. The Permissions set for an Informational Object and/or Data Element must have an Owner and/or one or more other Subscribers who cumulatively control all possible Permissions that may be respectively granted, cancelled, or modified for the respective Informational Object or Data Element.

Subscriber comprises an entity, either a business or an individual, who is authorized to access and utilize the capabilities of the present Common Point Authoring system. A Subscriber may be a major corporation, a consumer, or small producer initiating a product supply chain culminating in a consumer's purchase.

Exhibit B
Suggested EPCglobal Architecture (Diagram 1)

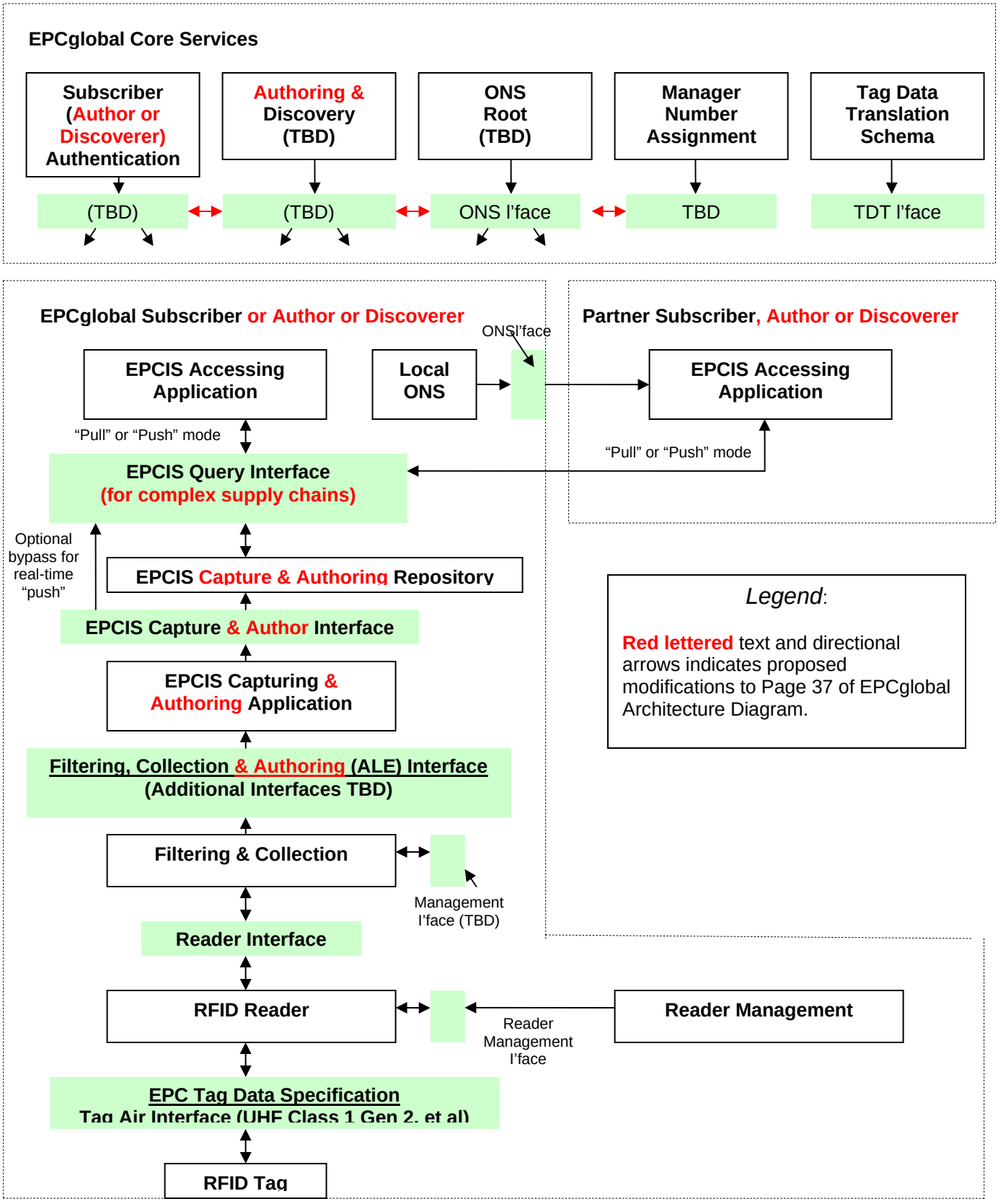
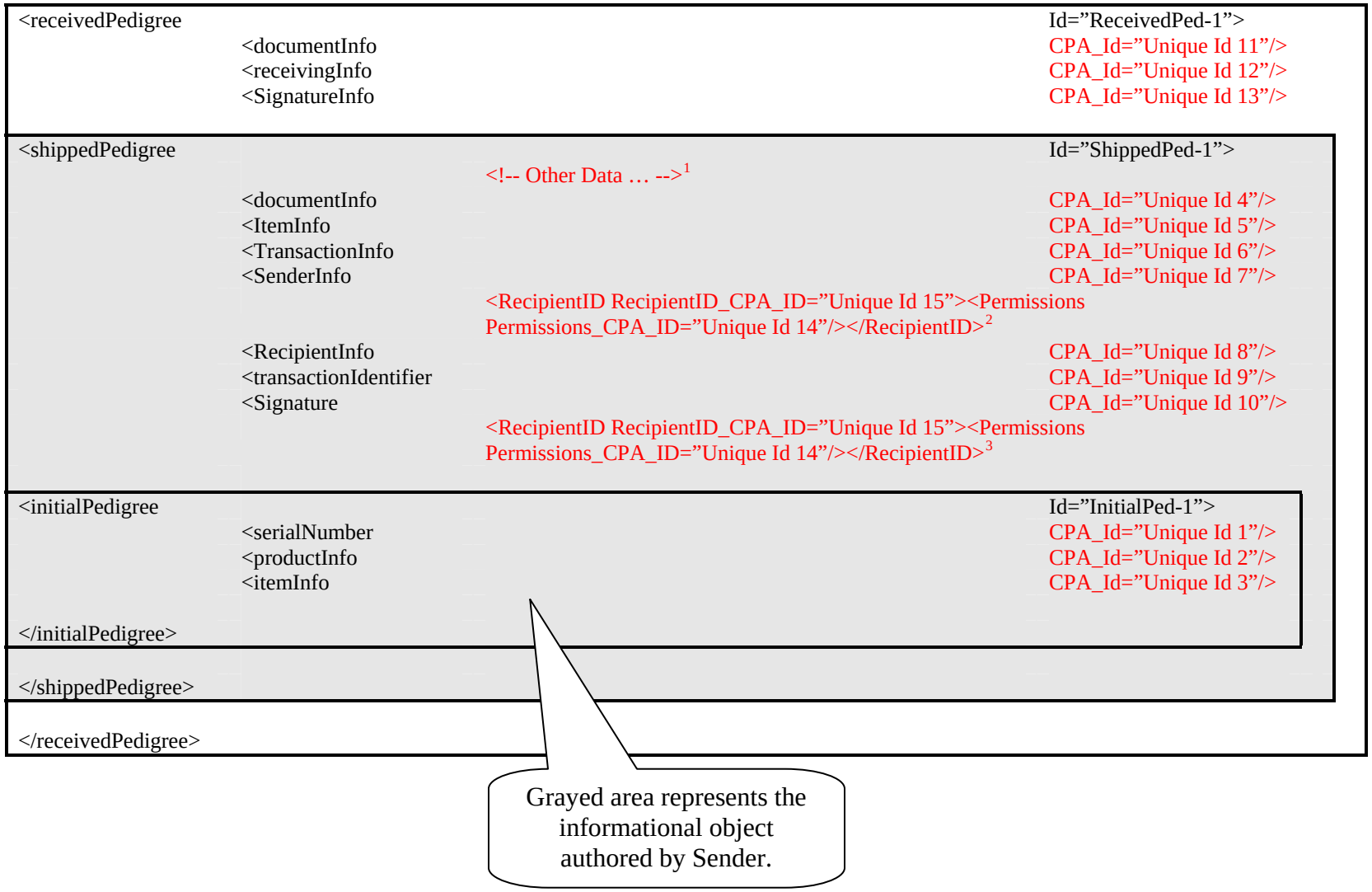


Exhibit C
Mock Registered CPA Informational Object Bearing EPCglobal Pedigree Data Elements



[1] This Mock Registered CPA Informational Object (registered, for example, into the CPA Reg. Data Elements DB in Exhibit D) also contains "Other Data …" such as formatting data, permissions data (see following footnotes), unregistered Data Elements, registered data objects, unregistered data objects, registered data sets, and unregistered data sets.

[2] An example of permissions data. Unique Id 15 represents a pointer to the Registered Data Elements Data Base (see and compare Exhibit D) of the value for the Recipient's identity. Unique Id 14 represents a pointer to the Registered Data Elements Database of the value, "for recipient's eyes only'. Thus, SenderInfo is only for the recipient's viewing and permission is not granted within the EPCglobal Architecture Framework for viewing of SenderInfo by any other Subscriber.

[3] Same example of Permissions data as in foregoing footnote except that Signature is only for the recipients viewing and permission is not granted within the EPCglobal Architecture Framework for viewing of Signature by any other Subscriber.

Exhibit D
Suggested EPCglobal Architecture (Diagram 2)