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Good evening. I am Stewart Brand. As usual incest is bad in biology but probably good in intellectual affairs. And I didn't really realize this that Alex Wright who is speaking tonight has already been a part of Long Now operation, Jim Mason found him a couple of years ago when we are just starting the Rosetta project to get all the languages in the world online. And Alex came out and he was the information architect for the original Rosetta site where framed it up and got it in the direction. It is now advancing rapidly. I was just asking him before hand, now the information architect for the New York Times is what's exactly that's happening and I realize there is going to be long answers so if you want to if he doesn't explain during the talk, ask him about it afterwards. The thing that I guess is common with most of the talks and the series is we look at phenomena that are usually looked at in terms of their scope and breadth impact. But not so often in terms of their time depth. And the time depth gives you this other perspective on all sorts of things. And something that is obsessing is more and more from week to week, day to day cell phones and what not. It's managing information. They say this is the biological centuries also still an accelerating information century.

So the long term perspective on dealing with that is what we have got tonight from Alex Wright. Well, thank you Stewart and thank you Ziander and Daniel for setting this one tonight. Thanks to all of you for coming out. So it's a real I am really thrilled to be here, I have been a long time fan of the Long Now Foundation and I will just mention, I have done some work with them in the past and I remember and I hope you all are too. and you know, especially as a first time and you know, relatively unknown author, it's you know, it's a great opportunity I really have pleased to have a chance to talk about so many ideas of my book. so you know, my book just came out a few weeks ago and I am doing a little bit of publicity around it and a couple of interviews and few weeks ago, I did have a quick through email interview with some folks at Powell's Books up in Portland, all kind of people referred to them - great big independent book store up there right yeah definitely buy your books online from them. It's anyway, so this was a Q and A and they asked - one of the questions they asked was, "what was your favorite book as a child?" and I had to think about that for a little while and I didn't really have a single favorite book but you know, the ones that came to my different times, you know, the ones that might have come to mind would be like the "The Phantom Tollbooth" or, "A Wrinkle in Time" or you know, I wasn't saying "The Lord of the Rings" or that was probably true but the book that I ended up mentioning this is going to sound like I am playing to the crowd here but this is honest to god what would I have said was "The Whole Earth Galaxy" so - and the reason the reason I mentioned this was, when I was about 10 years old, my parents had these friends in Cambridge these hippie friends and well actually he was a physics professor.

But there were philosophical hippies and they started sending me the whole of the catalogue, every time, every year they came out. I don't think it was every year, but when ever it came out, they would send me a copy of it. And I didn't really know what to make it of at first I would just sort of flip through in and I think it was a kind of a bunch of you know, interesting

strange stuff in here. Its stories about you know, how to build your own one year or how to go Kayaking or you know, okay it was just a real mismatch of stuff. I think they had a page about the Kama Sutra which I think was particularly fascinating, but it also had as I would call the whole section on the whole systems and the whole idea that it was interesting to me about the book and over time I started to sort of understand a little bit was that it took this sort of broad view and this sort of this had this sort of approach to really tying together a lot of seemingly sort of disconnected information and presenting it in in a very in a new sort of context and it was very different from those books. And you can really read it from front to back. But it was really just a lot of sort of chunk you know, little chunks of information that were sort of pulled together in interesting ways and a lot of people I think since you know I made the argument there in a way, sort of anticipated the way which I think is true I I can't say it's just to every road I hadn't great vision of that I think I was immersed in the Kamasutra but but it did I think I have a sort of point of view to it which was this notion that that things were connected and that you know that we could look at sort of the art of facts of human culture in in a larger context in kind of an ecological context and looking at and understanding that you know that we could actually look at what we do you know that kind of systems we create as part of may be you know larger systems or looking at you know has systems work in nature and so I think that's it's a very interesting sort of point of view there that I think has has had legs and I think especially as the web has taken shape a lot of people have started to think about it in those terms as you know possibly a kind of you know as being sort of an ecosystem or as being may be even having some possibly some kind of evolutionary significance and that's what I am going to talk about a little bit but this sort of gets me into the - what I want to talk that tonight which is this notion of deep history and the term deep history gets it doesn't it's not a real clearly defined term that different people use it in different ways but the way I'm using it tonight is is it's really a way of looking at human culture in - on sort of an evolutionary time line. So I suppose to that sort of traditional and narrative of certainly western culture which usually starts about you know quite two three thousand years ago with the Greeks usually, the ideas have may be take a sort of a longer view and to try to explore whether there are patterns that we can recognize in some of there in in you know more in - even in recent human history that might be part of a longer term trajectory that we could actually explore in terms of you know of evolution, another way of putting it might be you know so the question I want to ask tonight is really you know can we say that information system evolve and if so what does that tell us about you know that the sort of experience that we are all going through today, I think we all you know can look around and see that we are we are living in kind of a you know pretty interesting time and that there is a - I would say huge volume of information being produced right now in all kinds of new ways and receiving all kinds of social change and cultural change and you know political change and you know we are going through a period of lot of disruption and as I say there there had been people who suggested that this is some sort of evolutionarily leap forward. Well I think we have to be a little bit careful about that but I want to give you a couple of examples, people who sort of try to make this case, one is Ray Kurzweil who I saw give a talk at the Long Now Foundation I think a year or two ago and he makes the case case that you know the the emergence of network computers is this basically in evolutionary advent that were affectively seen the the emergence of a new kind of global intelligence that you know that is on power with the creation of a new species or something. So it's a pretty you know and he is Kurzweil is also you know brilliant guy who is - is out

there but but this is certainly a point of view that has some you know credibility. This is also similar lines that Danny Hillis another long now person. This is from Norton wired a few years ago exist made a similar sort of case that you know we are living for a period where we could at this as sort of an you know an evolutionarily leap forward.

Well I think we have to be little careful with words like evolution and before we start a sort completely bind to this notion that you know the information system is literally evolved, I think we have to really recognize that there are some pretty strong and and fairly you know a legitimate objections to to using the word evolution in that context. I think the late Stephen Jay Gould probably voice this as well as anybody, where he suggested that really using the term evolution as a descriptor for the way human cultural systems move forward is a little bit misleading and he made the case that you know and one sort of common fallacy is this notion that that evolution equals progress and his point of view was that you know if you really look in the history at the sort of evolutionary history of the planet, the most successful species on earth are and have always been bacteria all right, they been around for two billion years, they haven't really changed much and yet they are the dominant you know by any objective measure the dominant life form on earth right.

So if there are evolutionary success story that really haven't had to do much right. So when we start starts sort of give ourselves you know too much credit you know as you know in evolutionary terms and its worth keeping in mind that our own experience is pretty limited and that you know we should really define our terms carefully before we start you know talking about evolution. This is a phrase that is often used by so called cultural relativist who objects the whole idea of talking about human culture in sort of biological terms I mean so all culture comes from culture, so the argument is that all the culture is the human culture is such a complex phenomenon that it can be reduced to sort of simple biological evolution not that evolution is simple but that it it's a complex phenomenon that cultural phenomenon come out of culture and that it's not predictable and it can't you know we - we have to be careful about trying to you know boil that down to a simplistic argument.

So I think it's worth acknowledging those objections before I get into this because I am going to talk a bit about the ways in which I think evolutionary theory actually does apply to the to the progression of information system but I want to give basic knowledge to the objections and to talk about you know how far may be we can take that case so - so just to go - all the way back, so the the very early - if we look at the very earliest you know emergence of life on earth, all these complex life, complex organic life for a long time that the the conventional wisdom in - among biologists was that you know life forms evolved as sort of individual units and you had you know simple life forms that progressively you know there adaptation became more complex and more specialized and eventually resulted in you know very complex organisms like ourselves, well a couple of decades ago a biologist named Lynn Margules sort of challenged that conventional wisdom and she suggested that actually we could look at the origin of life in a different way and her theory was that the very earliest complex life forms actually emerged as kind of social collectives and so her theory is that actually the earliest sort of multi cellular life took shape as unit as individual - a single celled organism started to collaborate and work together and effectively sort of exchange data with each other and that over time those sort of social collectives coalesced into larger organisms that eventually started to cohere and then to make it very long and get radically oversimplifying here but over time those complex - those larger life forms then also started to aggregate into sort of social organizations.

And so the reason this is interesting I think is that it raises the question of what's the boundary between sort of an individual life form - individual unit of life and sort of a social organization, it cannot be said that a social organization evolves and so if you take this point of view, you would suggest that yes there is a sense in which social units actually do kind of evolve in the same way that individual life forms evolve, so how does that work were there a couple of sort of patterns that work there? One is networks, so at - you know at the simplest level at all sorts of sort of levels of the biological hierarchy, there are - there is this pattern of networks or sort of entities that coalesce into kind of self organizing groups that that are sort of flat, that is not only a top but they tend to sort of you know come together or drift apart in a sort of you know self organizing way, the other pattern of work is hierarchies and what you see in the you know in history of complex life forms is that as networks take shape they tend to give rise to hierarchies that emerge out of those networks and so in the case of organic life you had you know networks of individual organisms came together and over time sort of hierarchies like complex life forms emerged, then as those as those complex organisms started to come together, they also formed sort of social networks over time new kinds of sort of social hierarchies emerged out of that so this is sort of pattern of networks giving rise to hierarchies which in turn coalesce into networks which in turn give rise to new hierarchies, so this is sort of a theme that I try to work within the book as this is that how far does that pattern really go and what can that tell us about the way that - the that people and other animals actually interact with each other and and is there something we can learn from that in terms of thinking about information systems So we can look at - you know throughout the animal kingdom there are all kinds of examples of these sorts of dynamics that work and I am not going to get too deep into this but but in the book I do spend sometime looking at the - for instance at the at the the study of insect colonies which were a great example of how these sort of social organisms take shape or you have units of sort of fairly simple individual life forms who come together and a sort of more you know a a higher kind of intelligence emerges out of their interaction So if there is all kinds of stories about ant colonies and beehives and how they they function in a sense as kind of information processing machines that that have certain characteristics that seem to not be predicted by the individual intelligence of the of the organism. And if we go further sort of up the chain in to more complex life forms, we can also see these sort of sort of patterns in other animals as well so this notion of kind of a super organism that is in entity that's made up of individual life forms that where the the social groups takes on its own sort characteristics and and functions as a almost as a kind of higher brain function for the group but with a kind of distributed intelligence and these kinds of phenomena have often been - been used as kind of a metaphor for the web or where we see also this very distributed kind of intelligence where we have you know a network that's very flat and yet we seem to see you know certain kinds of clusters or organs or sort of ad-hoc organizations emerge out of an otherwise flat network and so there is a lot of computer scientists have actually looked at these sorts of biological models of computing as as frame works for thinking about the way the way computers work and Ken Kelly has written about this one pretty outgoing in out of control and then a quite of few other folks have sort of explored this this sort of theme. So I think there is a a case we made that there are information systems at work in the natural world and that there are these sorts of patterns seem to exists and if that's true you know if we can say that other animals do sort of traffic in information and that they have some thing like that if they have got a system or at least strategy for for exchanging information with each other, then

we can start to to ask the question you know how does that - what is the mechanism by which that sort of phenomena happens because we can't necessarily explain that purely in terms of genetic evolution, in other words you know if just sort of look at the DNA level, there is only so much that really going to tell us about these sort of social interactions.

So there is a pretty compelling theory out there that sort of explains how this works professor E.O.Wilson famous biologist at Harvard he is the guy who introduced social biology I am sure lot of people I know he is, here is his theory of epigenetic rules and and epigenetic rules he defines it is a it's basically a - it's a concept, it is not a actual you know biological thing you can point to. But the idea is that it's it's a framework for explaining how certain kinds of processes sort of cognitive processes or mental capacities get a get get evolved, but actually enable a social organization to create a culture in other words it explains how individual organisms over time develops certain characteristic through genetic inheritance that enable cultural behaviors to be transmitted from generation to generation and his argument is that through epigenist rules, certain culture patterns emerge that are actually passed on through culture from generation to generation and and those patterns are reinforced in the genetic code so this is kind of a little bit of a complex idea but I hope it's making at least little bit of sense. So you guess a few examples of a epigenetic rules, so he distinguishes between primary and secondary rules so the primary the primary epigenetic rule would be the fact that we all perceive sort of the same range of the color spectrum, would be kind of a primary epigenetic rule we all are equipped to sort of see things in the same way.

Similarly we have lot of our sort of senses, sort of - seem to be governed by this kind you know that there are some value to humanity as a whole and us all seeing the same color spectrum or hearing the same range of sound.

But he even takes that argument a little bit further and this is where it gets a lot of controversial, he suggests that you can also use this frame work to explain for instance why in every known human culture this ever being studied people are afraid of snakes, like well there is no gene that tells us to be afraid of snakes there nothing though there is no gene you can point to as far as we know I think for all the genetic sequencing they are doing, they haven't found the "fear of snakes" gene and yet every body, pretty much you know not may be not every body is afraid of snakes but all cultures have some sort of you know serpent mythology or some reasons, you know there is some thing about about us that seems to be predisposed to fearing snakes. And so the way he would explain that is that its sort of a combination of genes and that the basically over a long period of time the people that were afraid of snakes were much more likely to pass on their genes than people who weren't afraid of snakes.

All right so so, it' you know and so he takes a little bit further even and this where it really does. He get into you know, a very contentious area. He suggests that you can also use this to explain why there are so many similar narrative archetypes in human cultures. For instances that the heroes descent the presence of tricks regards and all kinds of mythologies; he goes so far they suggests that there are some evolutionary basis that these sorts of archetypes actually have an evolutionary role and put in helping to helping the group to survive and and reproduce; and that there are some values and there sort of you know, and certain kinds of cultural archetypes and actually creating a a stable cultural system that actually benefits that the larger group. And the last one in this list is really where I think he gets particularly interesting. He he suggests and and there is lot of data to back this up. That also our propensity for categorizing the information also has something to do with the epigenetic rule. So, I may give you example of

of what that means so if we think about it, - In every known human culture that's ever been studied, people categories information about plants and animals. And if you think about it, this is sort of the primordial information system. All right. If you are living in a tribal community you know 80000 years ago, it's essential to have a shared understanding of the natural world. You have to know you know, what's an extra poisonous you know, what plants you can eat and you have to have some kind of and that that kind of information you know gets a buildup overtime. There were lot of trial and error, right. A lot of people eating the wrong plants or the wrong mushrooms or whatever. And and that information gets preserved in that sort of cultural framework that gets passed on and gets actually embedded in the language. And overtime, these classifications actually become more and more complex. And you start to see you know, people start to actually create categories of you know noticing that you know there is may be categories of things that fly and there is a category of you know something like mammals and something like insects. And those categories get more and more granular overtime. Now, these were called Folk Taxonomies. And this is not to be confused with Folksonomies which something that you might have heard of and that must may be last year's password. But, food taxonomies are basically systems for categorizing information about plants and animals that are present actually in every human culture that's ever been studied from "Papua new guinea" to yeah back of Australia to you know, the tribes of you know Native America. Every culture seems to have a system like this. And what's particularly interesting is that these systems bare an incredible degree of resemblance to each other. And they have certain characteristics that even in cultures that that evolved that you know that took shape you know physically on separate continents over tens of thousands of years. Fork taxonomies are almost identical and this is kind of a pretty surprising thing if you consider how different a lot of these cultures are in other ways. But they all have certain characteristics. They almost invariably have a concept of sort of higher you know the highest order of life forms like plants and animals. They have a concept of sort of a gene and a species and the sub-species. And what's interesting about this, that that categorization that's that is sort of hierarchy is invariable and very culture that ever been studied. There is guy named anthropologist named Brian Berlin, who spend his whole life studying this. And every tribal society ever documented has taxonomy of the natural world. That's about that's invariably five levels deep has five levels of categorization and the actual contents of it may very slightly but but generally they are actually pretty similar. So would seem to suggest that this might be an example on of an epigenetic rule. Or nobody has really studied that.

Anthropologists and by you know social biologist haven't quite gotten come to terms on this yet. So, but it seems to suggest that there might be an epigenic rule. So I actually from just writing the book, I wrote a note Professor Wilson and I said, you know what do you think? And he said, "I I agree." I think he said he thinks this is actually an example of of an epigenetic rule of work forward that's worth as again that I can't really site anything you know in the scientific literature to back that up.

But it does seem like a pretty compelling evidence that that might be you know example, that we might have a very deep biological disposition to categorize in the world in hierarchical terms. Well, a Folk Taxonomy does not look like this, right. This is an example of a folksonomy, I mentioned earlier and this is a kind of thing I think you see a lot on the web these days. I am fast forwarding all about we are I think a lot of people when they you know, when we look at the phenomena of network information there is sort of this idea that hierarchies are going to kind of

fall. There are all sort of hierarchies are going to kind of fall. There are all sort of hierarchies of knowledge are kind of falling apart, everything is very sort of networked and sort of loopy-goopy now. But it would seem that you know that we do have this disposition towards categories in the world in hierarchy in a hierarchical way that - that's pretty deep seeded. This is probably going to be little more detail and we want to get into but this is Berlin has developed kind of a model for have this for what these Folk Taxonomies typically look like. An interesting question is you know why why are they so similar and where does that structure come from. There is a sort of five or six level taxonomy you know; come from what is the sort of explanation for that?

Well, there is an anthropologist named Emile Durkheim who has wrote a lot around the turn of the century, and he also studied Folk Taxonomies. And he believed and a lot of people agreed that there is a relationship between Folk Taxonomies and family trees. This takes a little explaining but he believe that in cultures that don't have any sort of ability to record information and they don't you know, cultures that don't have any alphabetic you know, writing psychology that they use these Folk Taxonomies as a way of projecting their understanding a family relationships. And so it's it's very common in Folk Taxonomies for people to describe a particular animal as belonging to a kind of a parent category or to have a kind of family relationships. We do this all the time. We talk about our cousins, the chimpanzees for instance. You know, the way the people use those sort of family terms if there is something about the way we relate to our our own genealogy that is some how bound up with our understanding of the natural world.

Here is another example of a family trait Charles Darwin's family trait. And here is another family trait. So this is the genealogy of the Greek gods. Now, what's interesting here is that there is actually a relationship between this kind of mythology and taxonomy. And this will take me a little explaining but if you look at most mythologies and world cultures, every there are ways of explaining the natural world in addition to being a collections of stories that people tell. They also have kind of coded meanings so every god kind of has a double you know, they often have sort of animal animals that they are associated with or natural elements you know, Zeus is the god of thunder or you know, what have your this one you know, this goddess turns into a deer or whatever. And through out encounters there are these kinds of connections between taxonomies and mythologies. And that relationship actually goes pretty deep so this was was a great book by Hobart and Schiffman called "Information Ages" and they talk about this a little bit and they talk about how genealogy is actually an ideal way for people to classify the world especially we are talking about preliterate societies here. it gives people a framework for sort of capturing what they know about the world around them and encoding it in the sort of you know, mythological - related you know - stories and then that can be preserved through generations by having this sort of genealogical structure around that and so what you see in a lot of these cultures is that the mythology is as I say it's really kind of an information system. It's a way of categorizing information containing a lot of information that's kind of cross referenced in in interesting ways and those systems that kind of taxonomy often plays a pretty direct role in actually shaping the way that people live together and the their actual social structure that sort of you know, that grows up around it.

So this is a photo of a - Zuni pueblo. So the Zuni people live in - what's today or living today mostly New Mexico and - when the Spanish Conquistadors first encountered the Zuni, they noticed something very unusual about the way they they set up their villages, their plebes,

each pueblo was divided into quadrants and each quadrant had a particular sort of family a kind of clan within the larger tribe. And that each pueblo, there was the exact same structure. So there was like you know they would have an you know north south east west and then there would a group that lived in the middle and each of those groups had a particular name and a particular sort of relations, set of relationships with the natural world so you would have for instance the people in the north would have a particular association like bears and you know a certain kind of snake you know a certain kind of bird and certain elements or the weather that might be associated with rain you know or wind or fire or would have been and you would also have a particular sort of social responsibilities divided up between this groups so the people in the middle would be kind of the priest class and the people on the you know one side of town would basically be responsible for for keeping the peace and the people on you know in another quadrant would be responsible for making war people would sit around and folks news so you had you know you had give a division of social responsibility that was very much tied up in this you know in this kind of taxonomy, this sort of understanding of the natural world. another example in the out back of Australia they discovered a very a ever similar sort of set up where a lot of the tribes in the out back would have of the aboriginal people would have a similar sort of division of clans within the larger tribal group and they would have certain sort of dietary restrictions like this group you know this particular clan would only eat kangaroo and this one would only eat emus and - and they would also be sort of charged with having a particular sort of domain of expertise about you know particular animals and particular natural elements so again it's - the idea is that the - you know in the sort of preliterate societies, there is a fairly deep relationship between taxonomies and social organization and so and this is something you know even this is something that a pattern that over time has has continued to play out as we have seen that the relationship between information systems and social organization goes pretty far back and and there is always been a fairly direct relationship between the way people organize information and the way they actually organize themselves. So so and today you know we still organize things into hierarchies, right? This is a sitemap from a from a website and it seems to have you know as I see these things a lot of them sees this things a lot of them seems to echo this kind of structure where you have this kind of hierarchical organization that kind of somehow looks a little bit like a family tree and people often, who do websites often talk about pages on a website having like a pattern child relationship to each other which is you know kind of an echo of of like a folk taxonomy or as you know that kind of thinking so this seems to be based on some sort of - there seems to be some deep you know propensity that we have for organizing information in a certain way. So so we used to bring things forward a little bit so so folk taxonomy is a really kind of a - as I said a kind of basic way of organizing information from most of our species history and I think they are very - actually not studied all that often and I think they probably should be because we were you know for at least probably 80 to 90,000 years they were a kind of the dominant way that people organized information with in these sort of methodological taxonomic systems that were basically transmitted thoroughly you know from culture - what happened about just to fast forward now - to about 30000 years ago - so for for most of our species history, people didn't really have symbolic artifacts they didn't really communicate using external symbols or objects.

What happened about 30,000 years ago and this is kind of a a homework of evolution is that adaptations tend to happen when there is a change in the environment or changing conditions,

what happened about 30,000 years ago was the last great European ice age and what happened about that time was suddenly across much of the - you know - parts of you know much of the world that was populated by humans, suddenly temperature started to plunge and the small game that people have been used to relying on mainly from most of our you know our species history people have been sort of small game on squirrels and rabbits and pigeons and and living it very sort of loosen that - sort of scavenger roots, what happened about 30,000 years ago is the ice age came was that small game started to dry up and a lot of vegetations started to disappear and people suddenly, it was cold there out, they had to start basically banding together to survive, they were you know starting to live in caves for instance and the foods are by increasingly and they weren't able to find the ready food supply that they had been able to to find, the sort of hunt began like only mammals had been you know eat [0:34:57] \_\_\_\_\_ cows and they sort of realized that they actually needed to collaborate to do that you know sort any body can can kill a pigeon but if you are going to bring down only mammal, you actually have to have sort of a team and you have a larger organization you know a larger sort of group of people living together in sort of increasingly growing settlements, so what happened as people were starting to live in these larger settlements was about this time that they actually started to create things like beads in in huge numbers, it was also about the time they started making cave paintings and it seems that this this activity was actually a response to changing environmental conditions where people suddenly had to sort of relate to each others in ways they hadn't had to before.

So people were in sort of loosing that organizations or loosing that groups, they sort knew who every body was you know you might, you knew who your sister was and you knew you know so and so had this sort of status in the you know in the group. But you are suddenly in a larger organization larger group of may be hundreds of people living together, it's not so easy to keep track of who is who, so there is a pretty compelling theory that a lot of this early symbolism was a response to that - to that need to be able to communicate status or to be able to negotiate relationships with people that you didn't necessarily know and so it is incredible if you look at the archeological data around this period there were settlements for people apparently spent the bulk of their lives creating these - creating beads, and ornaments may be they just had a lot of time on their hands because everything was cold out side and they were certainly they were spending a lot of time inside but it was I think incredibly important to these people for some reason that they will be able to create these these sort of totemic objects.

And what this did was, it facilitated what some called a release from social proximity so they said what - as people were able to basically use object - use symbolic objects to communicate their status to each other, they were able to to get beyond and then you know the need to have direct personal knowledge of who every body was they could actually have sort of you know mediated relationships with people you could sort of tell you know what status some body had and who you know who was who - who is married that sort of thing and what's interesting about this is it it created a - an opportunity as people were able to to negotiate those relationships and people came together in these sort of networks as as you know large amounts of peoples are living together new kinds of social hierarchies emerged out of that. So it was around this time we saw the first, what we would recognize as kind of tribal chief dummies, so you started to see a real sort of social hierarchy take shape around around - and it really has as a result of - nearly as partly as a result of this information technology that allowed people to you know to facilitate these kinds of relationships.

So it's interesting to look at that relationship between sort of a new kind and and a kind of - in a way disruptive information technology and and a wave of social change that seem to happen in response to it.

And I think its interesting also to think about this notion of a release from proximity and what that - you know and how we actually do the same thing today. And here is just a few examples of how we do that today right so I think like eBay seller ratings are great examples of this, I would actually able to negotiate a relationship with some body you have never met using a kind of symbolic totem that tells you some thing about this person you never meet and yet you self rely on that right I think its sort of may be some you know some parallel or so.

Sort of fast forward another few thousand years, so this notion that you know that of information technology emerging as a as a response to changing environmental conditions is is a theme that that seems to recur at different periods in history. This have seem to happen again about five thousand years ago when the first alphabets emerged, so it was about five thousand years ago that people started to live together in larger agricultural settlements so as as the technology of agriculture took shape you saw larger and larger sort of stable settlements trying to emerge and people are living together and get larger organizations and as a result of that a lot of commerce started to happen for trading sorry here we go people were trading with each other and as they started to trade more and there are more and more people and there is more of a sort of volume of activity going on, they needed to keep track of that and so the very earliest forms of writing were actually form of counting, they actually emerged as sort of counting tokens I think Samuel Johnson once said that "no man but a fool ever wrote except from money" well he was he was actually quiet right , there were there were actually would not be writing if it wasn't for money and and this is one of the first examples of that, over time those counting objects got a little more sophisticated and as there was a growing volume of transactions, people needed to do more than count, they actually needed to start making a list of things and so the first sort of alphabetic writing really emerges sort of list of you know inventorial list of goods and that in turn you know sort of yield that even more you know sort of a complex sorts of accounting in record keeping the first sort of government bureaucracy emerged to sort of to sort of keep track and until then conducting a very - very long story here but over time the you know that the modern sort of institution has we have recognize or the modern sort of bureaucratic institution took shape around the technology of writing and eventually you know that writing became more like what we have recognized as writing today, it started to become more narrative, people started to tell you know keep track of chronicle or stories about the king and then stories about the kingdom and that eventually you know somebody wrote Gilgamesh and then eventually you know it became a kind of literature. But during this period there was the emergence of of a sort of class of literate people as this technology took shape, a kind of social division took shape to call it where you started to see a a small group of people who had the who required the capacity for reading and writing and they became a kind of privileged caste a caste of scribes who you know the scribes was considered in Babylon and Sumerian to to have a status kind of secondly only to the king and and a sort of literate culture started to emerge and for you know most of human history that we have seen there was always kind of a fairly small a sort of upper caste of people who actually know how to read and the vast majority of people still continued to live in an oral culture and and this relationship between kind of a literate culture and oral culture is also I think that I that I explored in the book quite a bit because I think it is really relevant to to

some of the through conflicts that we are seeing today some of the cultural transitions that we are seeing today. This is a guy who is actually he is passed away, he was a linguist and he has written a lot about oral culture and how is you know how to understand them and I think it's something that oral cultures are actually not very well understood and not widely studied for some reason I think because we have a kind of cultural bias towards literacy because we are we live in a literate culture but he makes a point that to really understand the context for this as he he believes that electronic media especially communications through computers and television and you know the growing wave of electronic media, he he thought represented actually the resurgence oral culture and that to really understand what's going on.

We have to actually understand it through the filter of oral culture and not just through our sort of traditional literate you know literary culture and so what he suggest is that there were certain characteristics of oral culture that its as he says you are additive - aggregative and participatory meaning that it grows up overtime through larger numbers of people sort of you know pooling their experiences that over time as sort of you know folk wisdom emerges or people you know over time that oral cultures create create an understanding that's that's an aggregate understanding where as literate culture tends to be predicated on kind of the individual really you know trying to take sort of an objective stands and really sort of digging into something and beginning analytic and sort of abstracting from the situation and that there are very different modes of thought and that they are most of thoughts that - that kind of king co exist but they they often sort of come into conflict with each other and so it's interesting to think about oral culture in in the context of of what we are seeing today, I think on the especially on the web in a way I think you could say we are seeing actually a very oral culture taking shape, if you look at the way that people use things like e-mail you know instant messaging, you know twittering, blogging as a very conversational kind of tone to it and this is an example of a review on Amazon for example where you know a lot of people are able to you know go in and basically post their own comments whether on reviews and yet this sort of you know this sort of experience co-exist with a much more literate experience or you often have kind of be editorial review of a book like the I think library journal review or something and then you have a long last - sometimes long last of reader reviews. Then reader reviews again they sort of build up over time and they you know, you see gets a sort of an average reading so they get kind of aggregated where as the editorial review kind of stands alone is considered a little more authoritative. So I think it's usually example of how this sort of oral and literate cultures continue to co exist but don't quite come together. So so it's the back up to where we were. So as these literate cultures started to emerge, you started to see the you started to see the first sort of institutional bureaus emerged in support the preservation and the - you know, and the dissemination of information of recorded information. So you saw the first libraries emerged and the first libraries were typically kind of temple libraries or government archives. And then over time, they got bigger and bigger and they were the it was the famous library Alexandria. You saw these sort of institutional hierarchies emerging to take to sort of take custody of this growing body of recorded knowledge and and there were you know, there were ups and downs I mean you saw you know you saw the great classical period and then that sort of collapsed and there was a period of sort of instability and then eventually the you know, the sort of new kinds of libraries and archival institutions emerged nearly it is in Europe some again making very long story short here.

But it seems interesting to look at - as that sort of back and forth happen do you saw evolutions

in the technology of writing. So in the early classical period you went from sort of having writing and scribe in stone tablets and prepare the scrolls to eventually you saw the emergence of what we would think of as a book and that really took shape mostly in Europe in the what's called Kodak's book which means the book with kind of pages that you can flip through. Took shape in Europe, sort of during the dark ages in the medieval era. And during that period, you actually saw some interesting innovations in the actual content of the - you know, of the books themselves. So if you think about a scroll, it's very linear kind of way of reading. I mean it has a sort of that scroll is typically kind of one page and you read it from the top to the bottom. And think about a book, it's more of kind of a random access thing where you can you know, go into any page, read it and jump around and you know, there it's a sort of an - it's an innovation. It's a new way of organizing information.

And here in the medieval period there was some really interesting innovations that took shape. This was a example of Canon Table. This was done in one of the I think one of the Irish monasteries I think. And this is a kind of a a hypertext like view of the bible. And so what this does is it basically is kind of a visual index to books of the bible. So it basically takes like a story in the bible and it cross references across all the different gospels. And the idea here is that you know, the person who created this was able to kind of zoom out from the bible and create this kind of view into it that had this kind of you know, the sort of conceptual hierarchy that let you kind of you know, extract you know, zoom in and zoom out of the text.

There is another interesting this is an example of medieval bestiary. And we are to bring this up and this is also a really interesting example of how oral and literate cultures come together. The bestiary was a extremely popular book in medieval Europe. And it was a book basically it's a book about animals. And there are often kind of picture books there it was based on an old Greek text but it was sort of added to over time over about a 1000 years, it was the story is kind of evolved and each of the story is about the animals was eventually sort of layered on with some sort of allegorical significance. So for instance, you know, there was this story about the elephant who had no niece. And the elephant had no niece because it was kind of like of pillar of faith or something like that. and there was a story about the lion and the lion was considered to be a representative of Jesus and so, for instance people have read like the lion the witch and the wardrobe, that's where that image comes from if the lion is as Jesus goes dates all the way back to to this book. so I think - what's interesting about this I think you can see some echoes as some interesting things here so you notice that in this at least in this image, Adam is kind of classifying the animals. So he is kind of putting them into categories and and whole notion of Adam naming the animals is sort of somehow kind of echo of that that basic human instinct to to categorize the natural world. What's also interesting is that this the bestiary was incredibly popular among medieval people who couldn't read and often often a Parish Church in in Europe would only have two books. They would have a copy of the Bible and they would have a Bestiary. And the people or the villagers are you know the peasants would love to come in here, stories taught to them out of Bestiary. Because it was a very you know, they are very visual and they were sort of some how resonated with this sort of deep interest that people had in animals and and understanding the natural world. And this was the way serve connect that that sort of folk tradition with this you know, with this you know religious meaning. And some how it's a way of bringing together that sort of all you know sort of and and all culture with the kind of literate culture. And if you are going to Churches around this time, they often have images that are right out of the beast areas all over the walls.

Ideal of images of you know of lions and and different animals that are directly tied to the to the images that are in beast areas. So, - also during this period, around the the sort of late middle ages and beginning of renaissance, in the minimum monasteries they were you know were were sort of kind of think of them as being a a lot of the monasteries as being sort of centers of book production and you know scholarship which they were. But there was also an interesting technique that was been developed in the monasteries about this time. It was called "The Art of Memory."

And the Art of Memory was a particular technique that was taught in certain monasteries that enabled amongst memorizing incredible amounts of information. By some accounts, people who master this technique could actually memories that's something like 200 after 200,000 pages of information there were people who claimed to have memorized the whole Bible. You know every point of like the Cannon law, all kinds of legal documents. Some of them apparently performed this incredible feats of memorization. And they way they did that was by doing these complex visualizations. And the the you know, its, a lot of the techniques has been lost before we understand the way they did it was that they would create these kind of memory palaces that they would visualize. And they would use and with in each palace there would be a series of rooms. And within each room, there would be a set of objects that would have a particular meaning that they would memorize. And then some how those objects would then be strung together into you know, - into words and texts that could be memorized.

So you know very involved technique, took years and years and decades to to master. What was interesting about is it it some how invoked kind of spatial memory in a way that you know, if we could memorizing is just sort of memorizing sort of may be rows and rows of texts. But it was a very different way a kind of three dimensional way of invoking memory and people some scholars have suggested that may be there is kind of a an echo of kind of a hypertext kind of idea here where if you think about the way people sort of navigate interact to information spaces that is it's also kind of a 3D kind of experience and uses that kind of spatial memory.

And there was even a guy named a guy who actually tried to build kind of a a physical fact simile of the the - the art of memory. The guy named Camelot who built the thing called the theatre of memory and it was this incredibly popular attraction in Venice in the 16th century I think. Where he basically build this this big contraption and it was kind of walk into this thing. You know, apparently was kind of like a big theatre you would walk in and there would be all these little windows like wooden boxes with windows, and you could go in and you could open up a window and it would have something written inside. And then, you that window would then tell you to go and you could cross reference that to some other window. So the idea was that somebody keep going and sort of extract information out of this thing. And he claimed that anybody walked inside would come out and be as as smart as Cicero or something. And he had a whole kind of sales pitch and he actually raise money from the king, kind of like venture capital to build this thing and and then even bankrupt and all the money disappeared and that sort of familiar stories for some of those. I mean, it was like an interesting sort of site you know. This keep the head a little bit and we want to leave some time for questions. So, I want to talk a because a little bit closer to the present act.

And I talk a little bit about the effects of industrialization on information systems. So again I

am trying to so the we have seen in a few different periods of history where we have we have seen a you know changing environmental conditions have given raise to some kind of new technology that has then changed the way that people exchange information with each other. And as a result, we have also seen certain social change sort of tighten that phenomenon. Well, that all started happening again about in the beginning of the 19th century. And this was excuse me, during the industrial revolution we saw a a period of a real explosion of publish information. And even though the printing press was invented in the in the you know in the fifteen century, - I seem sort of skipped over that, that little development - the the real boom in printing was really didn't happen until the 19th century and this is not particularly well, I am sure there was a coarse of boom in printing after the the printing press, but it was still for the couple of hundred years that followed still a relatively tiny subset people really had any had any number of books there were a few popular books like the devotional books that a few people had but a by and large it really wasn't until the industrial revolution that reading and the production of books became a really common thing.

So and so there were a couple of transit of work there one was that you had this the industrial technology and made it much cheaper to produce books and to produce them in mass quantities and at the same time as a result of industrialization you saw a growing urban population a growing urban population that was increasingly literate and so there was a growing demand and a growing potential supply of books, it was always really in the 19th century there is this huge proliferation of text and you know popular novels you know emerged during this period and dictionaries and encyclopedias and there were seen other incredible you know incredible burst of publishing activity and it was also during this time that the first sort of modern libraries emerged and it was suddenly in response to this this proliferation of books that you started to see really the first great kind of national libraries like the British library, library of Congress you know and eventually you started to see public libraries take shape before that - before the industrial revolution libraries were almost all private there were few sort of private subscription libraries, there were university libraries of course but typical even the big university libraries they didn't really need a catalogue particularly because they weren't much bigger than a room and they would often have some body who is called a professor of books whose job was to basically know every thing that was in the in the collection.

So if you needed a book you needed to know what the reader research of the topic you talk to the professor of books and they would basically steer you in the right direction, well in the 19th century that just became untenable, there is a huge number of books and people needed to figure out of way to keep track at them and so a new kind of institutional hierarchy emerged which is what we will think of today as the was the library catalogue and you started to see it about the mid 19th century the British library created the first sort of what we would recognize as a as a modern library catalogue with like subject headings and kind of a hierarchy of of understanding about of of topics and subjects and then eventually in America novel [0:42:23] Dewey, I am sure everybody has heard of who created the Due decimal system which we are still stuck with today and and you start to see this very sort of systematized approach to organizing information that in a lot of ways is really a bi product of the industrial revolution or really the modern library catalogue is a very industrial artifact and it's one that's increasingly sort of an acronistic I think you know in a in a sort post industrial world and its been a lot of pressure on libraries to sort of rethink the way that they they organize information.

But there were people who were thinking about this problem quite a while ago, so there is a guy

named Charles Cutter who was actually not as well known as Novel Dewey but at the time he was was actually Dewey's sort of great rival, he created an alternative library catalogue system that is actually the one the library of congress uses today more or less and he wrote this essay in 1883 and it was an essay about what he thought a library might look like in a hundred years so it's called the "Buffalo public library" of 1883 and he used this notion that there might be desks with keyboards on them with wires coming out of them and that people might be able to type in names of books and get picture of the book to appear on screen and that would just pop up some how, so it's pretty good all right.

So and you know in the years have followed few other people started sort of have these kinds of ideas HG Wells wrote pretty well known essay called "Royal Brain" where he also had this idea that some how but there could be some thing like a computer that was some how connected some thing like a network and that overtime people would be able to exchange information using these tools and he had this idea that eventually he saw it - he actually saw it kind of a big encyclopedia and eventually he thought the whole thing was sort of wake up and sort of - some how he didn't really explain how and and that it would become a kind of living organism in some some way so I think this is actually kind of echoes couple of those could you look at the beginning the presentation is a notion of sort of an emerging intelligence coming out of the network is something that you know it's got it's an idea that's been around for a little while there is another guy named [1:00:27] \_\_\_\_ who was a Jesuit who sort of writing some essays around 1940s 1950s may be and he also he committed a mistake but he also had this idea that that electronic communications technology would eventually give rise to new ways of organizing information and that this would also happen in a network and as part of that it would be a very revolutionary thing that would happen and there will be a new way of sort of interfacing with the world. This shut down was actually considered very controversial the catholic church barred him for publishing that is considered as radical because they thought that he was actually suggesting that it would sort of kind of divine consciousness or somehow you considered a very half messaging and but so nonetheless he actually had kind of occult following and there was one young Jesuit who became a particular devotee of his whose name was Marshall Mc Chuan who actually credited to show down as the direct inspiration for his whole idea of the global village so so we can see there was this sort of heritage of thought for you know at least several decades after the industrial revolution that something different could come along there could be some new way of organizing information, but no one none of these people really built anything along you know like that until a guy named Paul Otlet came along and I am guessing probably most people have probably never heard of him He is kind of a forgotten figure but a pre fascinating guy he was a French librarian or Belgium sort of librarian in the early part of the 20th century wrote some really pretty important books which mostly are now being translated about sort of information theory and he have this idea that that librarians basically had it all wrong that they were too fixated on the idea of a book and they were spending all the time worrying about how to get people to find a particular book, but his insight was that there was actually a lot of information inside those books and that if that information could actually be sort of liberated, you could actually create a whole different way of organizing that information and letting people find their own way to that information so he also says so he wrote a lot, he also do these great sort of diagrams and I like this is about people got the lucky terms popping out of their heads or illustrates the idea pretty well I think the idea is that you know you have ideas and then sort of books but if can actually extract that data out of

that books and file in some way you could actually create a whole new interface and here is this idea I am not going through the details of it but he developed a very detailed system for for how that work he had a very forward thinking kind of classification system that he sketched out but his other insight was that the people who were actually reading the information or interacting with the information could actually be part of that processes of organizing it and so his idea was that as somebody came in and actually pulled out the piece of information or anything that would actually become part of the record of that piece of information and those sort of trails through the you know through the documents could actually become become a new kind of document in a way and that itself would take on this shades of meaning and so this is little I am going to play snip of a documentary that was a made about in a few years ago

So why is nobody ever heard of this guy, right? Right, so well he is uh-huh well, it's I will tell called the "Monadenium" in the 1930s. And it was actually quite popular and very successful you know, people phoning in, research requests from all over the world, and he had a staff of people that were going through and organize this information and writing it down on cards and you get rooms and rooms full of this all this information. And have this incredible thing figured out and hadn't actually upend running and working. And then, the Nazis came, and they marched in and they tore the whole thing down, they emptied out the Monadenium to make room for an exhibit of third reich art and they threw every thing away.

And he died a broken man in total obscurity a few years later in middle of the war and that was essentially forgotten for about 30 years until a guy named professor at UC Berkeley actually a guy named Boyd Rayward actually no I am sorry Michael Bucklin and Boyd Rayward is in new Zealand. They are two scholars who sort of have resurrected his reputation a little bit and eventually have been going through and trying to get written some articles and try to sort of you know, resuscitate with some of his work little bit and doing some translating. They are actually rebuilt it have actually rebuilt part of them down in Belgium and it's become a bit of a tourist attraction there but he is still something better known there than he is here but certainly you know, he was a pretty visionary guy.

And he was around long before Vannevar Bush who was typically credited as the sort of forefather of the web. And we can right saw a couple of things about Bush. First, his first name is pronounced Vannevar, I found out and he is no relation to the current [1:07:34] \_\_\_\_\_.

And I am true; probably quite a few people know something about Bush. He is certainly probably best known for an essay he wrote he actually wrote in the 30s but it was published in 1945 called "As we may think" and in that essay, he passed this idea of some thing called the memex. And it's often it's generally credited as the sort of there is a direct lineage from this to the World Wide Web. Sort of conceptually there is a trade sort of progression of people who took this vision and worked with it and came up with what we have today.

So the Memox just I will talk about it just very really briefly. It's the idea that was that it was a tool for a scholar to basically be able to swift through a large collection of documents that would be stored on microphone and then to anotype this documents. And Bush's idea was that, as they, when as they did that, they were you know similar outline in this respects that they would anotype that those annotations would actually become part of the sort of paper trails so to speak. And would become would take on their own meaning overtime. So here this idea that as a result of that, you know, you would see these new forms of what you call them cyclopedias emerged that would then you know, begin would take on certain life of their own. So, the key you know the key sort of features of the Memox is that it's relied on users to



make associations between documents rather than this is what is different from outlay vision outlays. So there would also be sort of a a classification system on sort of from the top-down. Bush though that that the users would do all the work and basic