

Atelier Stratégique: « L'approche BIM au service de la compétitivité de l'industrie de la construction »

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Lessons Learned from National Deployment of BIM in Finland

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5 perspectives on BIM deployment in Finnish Business Ecosystem

Levels	Sector	Occupation	No of participants	Hours of interviews	No of interviews
Academia	Academia	Research Scientists	6	10	6
Public owned clients	Senate Properties (Building sectors)	BIM managers	3	2	2
	Finnish Transport agency (Infrastructure sectors)	BIM manager	1	2	
Public organisations	Governmental funding agency, Tekes	Manager	1	1	3
	Strategic Centre for Science, Technology, and Innovation of Built Environment in Finland	Manager	1	2	
	Intermediary interdisciplinary mediator	Manager	1	1.5	
Business & Management	Software developer	Manager	1	2	8
	General Contractor	Innovation & Business Managers	3	5	
	Architectural office	Managers	2	2	
	Private Organisation	Consultant	1	2	
	Engineering service provider	CEO, Manager	1	1.5	
	Engineering service provider	Senior Specialist Digital	1	1.5	
Users of BIM at the operational level	General Contractor	Site Manager	1	1	4
	Engineering service provider	HVAC Engineer	1	1	
	Architectural office	BIM technician	1	1	
	General Contractor	Production planning engineer	1	1.5	
TOTAL			26	33	24



Why Finland?

Importance of built environment

Real Estate and Construction Cluster in Finland:

- Produces and maintains the built environment for business, services and living = one of the key resources of the economy
- Constitutes the main part, **70%, of the Finnish national assets**
- Employs more than 500 000 people = **20% of the work force**
- Uses ~50% of the energy
- Operations €35 billion, Interest €15 billion, Total value of the forest € 40 billion



FINLAND

Value of built environment is € 400 billion

Why Finland?

- **World famous** for their in-depth BIM expertise
- BIM development at the national level since **1982** - Exploratory innovation journey without an example of best practice
- **Wide BIM adoption since 2002** – unique situation in the world
- Collaborative and **supportive culture** – key to BIM
- Special conditions - population of 5.4 million (2016) / very small market / **country where “everybody knows everybody”**
- And yet, **THEY PERCEIVED BIM ADOPTION AS BEING VERY SLOW**

Finnish Innovation Journey. Periods of development.

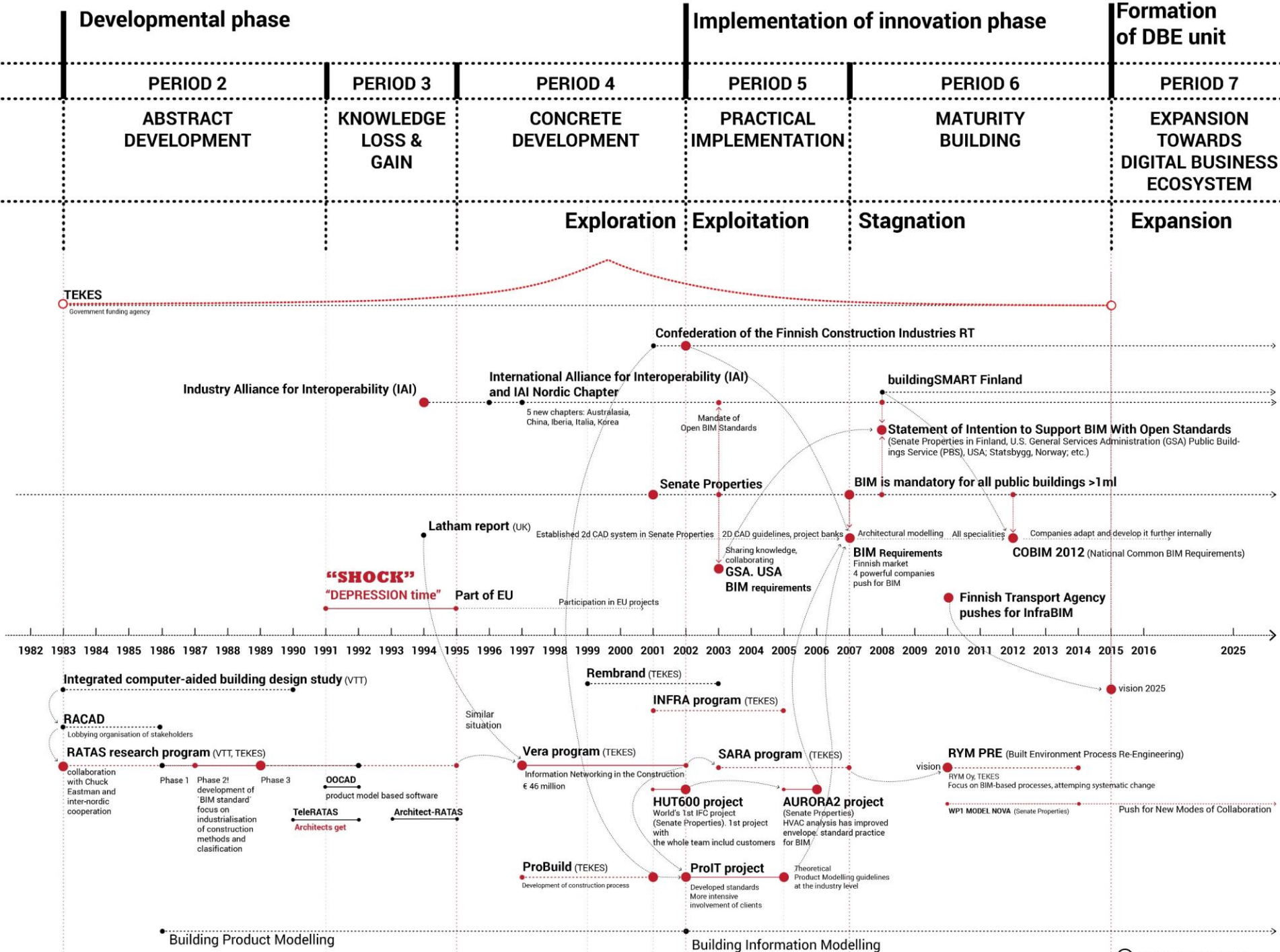
32 years of investment in R&D

Periods	1	2	3	4	5	6	7
Timeline	1955-1983	1983-1990	1991-1995	1996-2002	2003-2009	2010-2014	2015>
Innovation Journey	Formation of Innovation Unit period	Developmental period			Implementation of innovation period		
		ICT development supported financially by TEKES (1983-2015)					
Programs		RATAS	Depression	Vera	Sara	RYM PRE	KIRA-digi (started late 2016)
Program's focus	Innovation	Theory	R&D	Tools & Process	Business	Process	Digitization of AEC industry
World War II	Abstract Development		Loss & Gain	Concrete Development	Adoption, Implementation		
"SHOCK"			"SHOCK"				
EXPLORATION					EXPLOITATION		

Formation of innovation unit phase	Developmental phase			Implementation of innovation phase			Formation of DBE unit
PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	PERIOD 5	PERIOD 6	PERIOD 7	
EMERGENCE OF INNOVATION AND KNOWLEDGE HUB	ABSTRACT DEVELOPMENT	KNOWLEDGE LOSS & GAIN	CONCRETE DEVELOPMENT	PRACTICAL IMPLEMENTATION	MATURITY BUILDING	EXPANSION TOWARDS DIGITAL BUSINESS ECOSYSTEM	
	Exploration			Exploitation	Stagnation	Expansion	

Finnish Innovation Journey

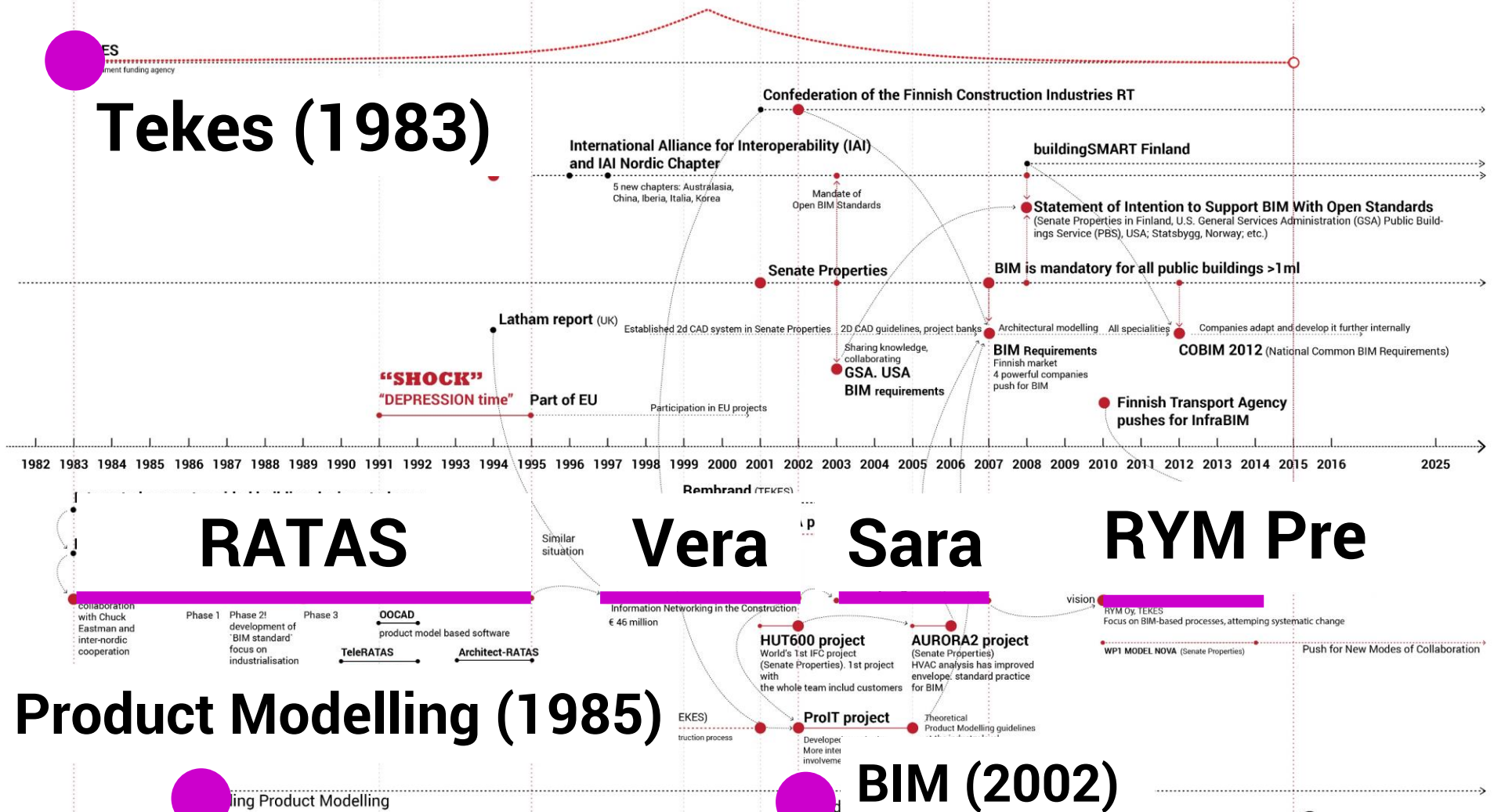
Visual timeline of facts and analysis



Formation of innovation unit phase	Developmental phase			Implementation of innovation phase			Formation of DBE unit
PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	PERIOD 5	PERIOD 6	PERIOD 7	
EMERGENCE OF INNOVATION AND KNOWLEDGE HUB	ABSTRACT DEVELOPMENT	KNOWLEDGE LOSS & GAIN	CONCRETE DEVELOPMENT	PRACTICAL IMPLEMENTATION	MATURITY BUILDING	EXPANSION TOWARDS DIGITAL BUSINESS ECOSYSTEM	
			Exploration	Exploitation	Stagnation	Expansion	

Formation of knowledge and innovation ecosystems with establishment of Tekes

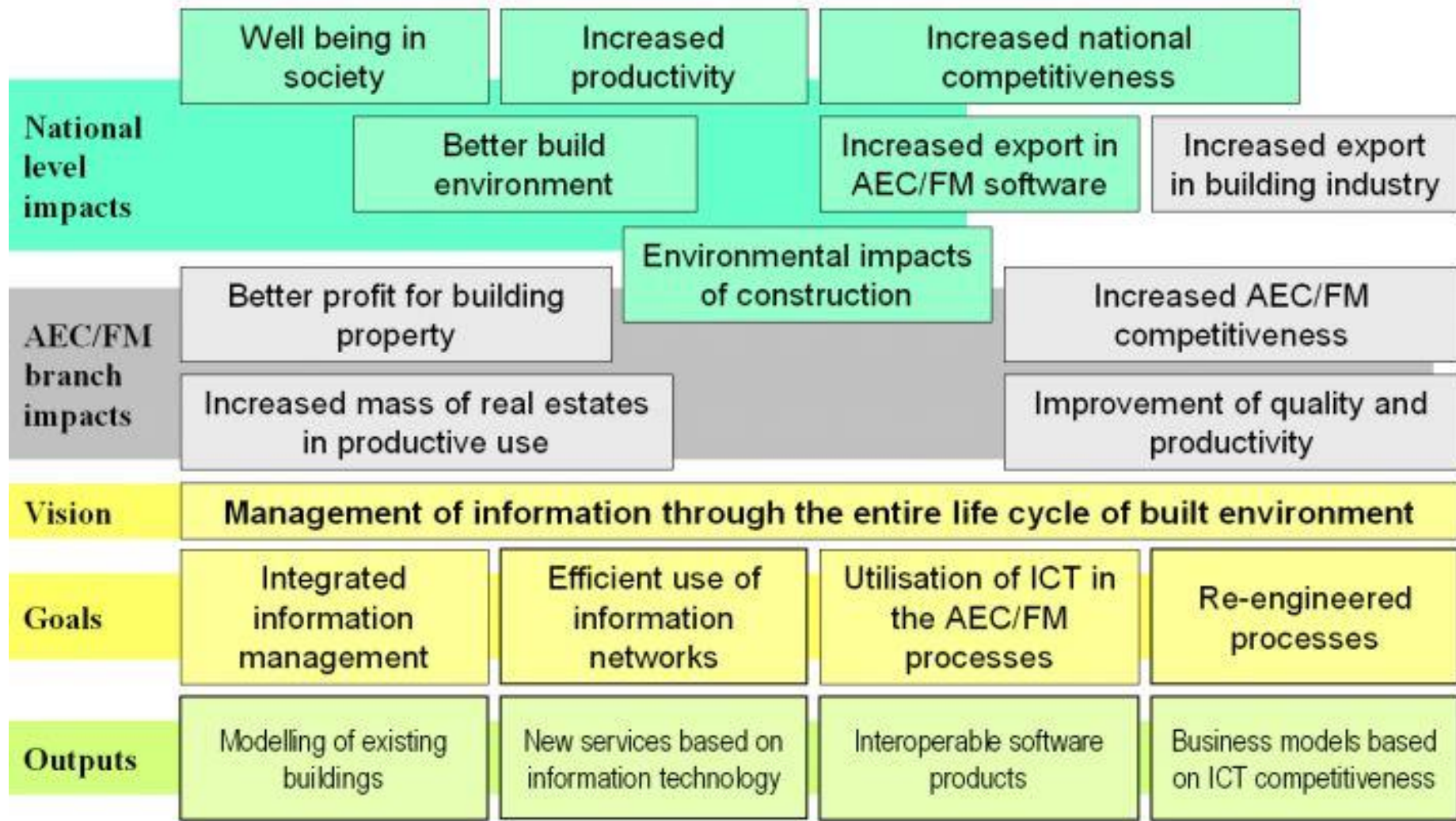
Tekes (1983)



Building Product Modelling (1985)

BIM (2002)

Vera's vision:
“Management of Information through the entire life cycle of the built environment”



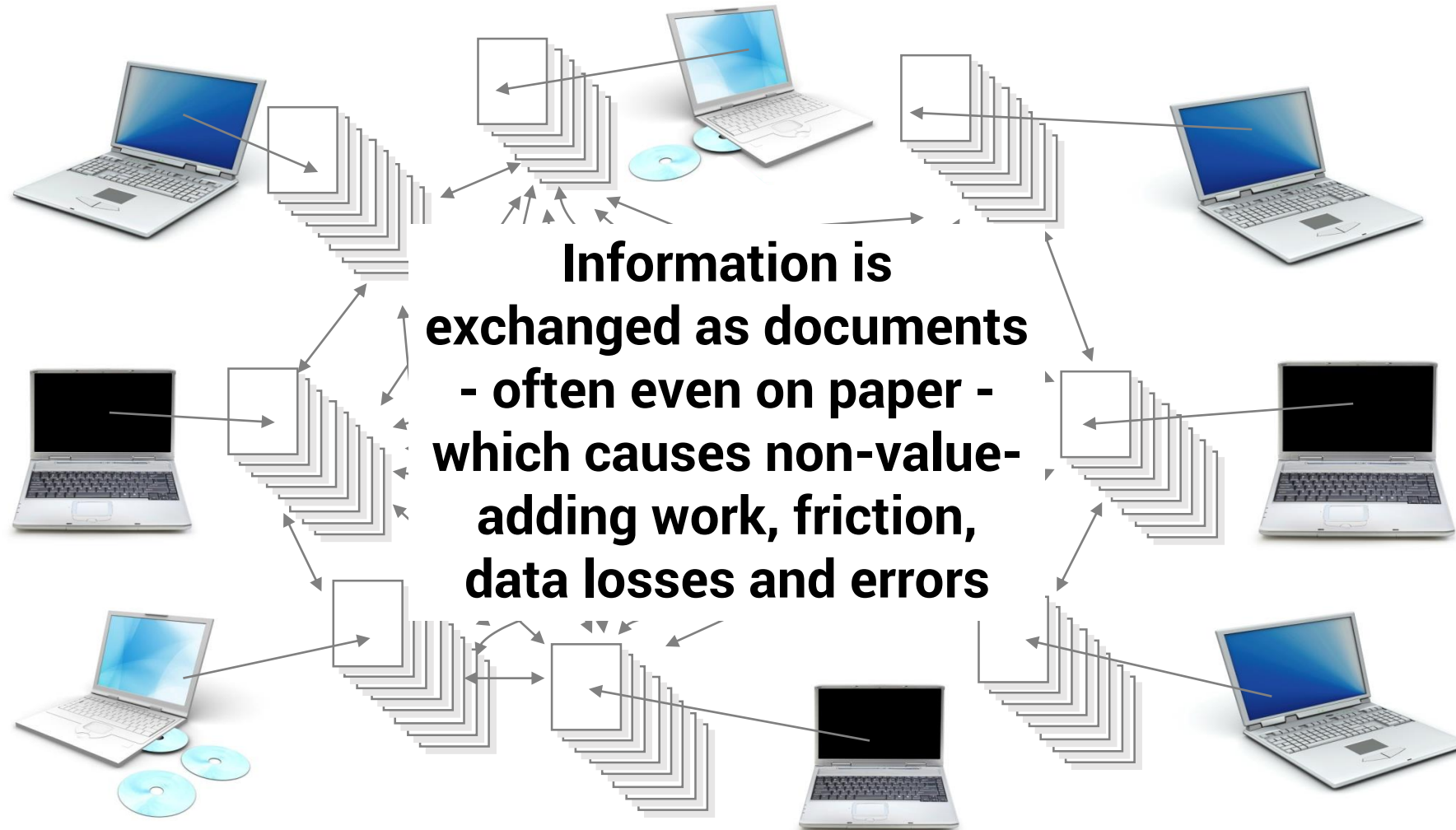
1997 -2002

Significant effort

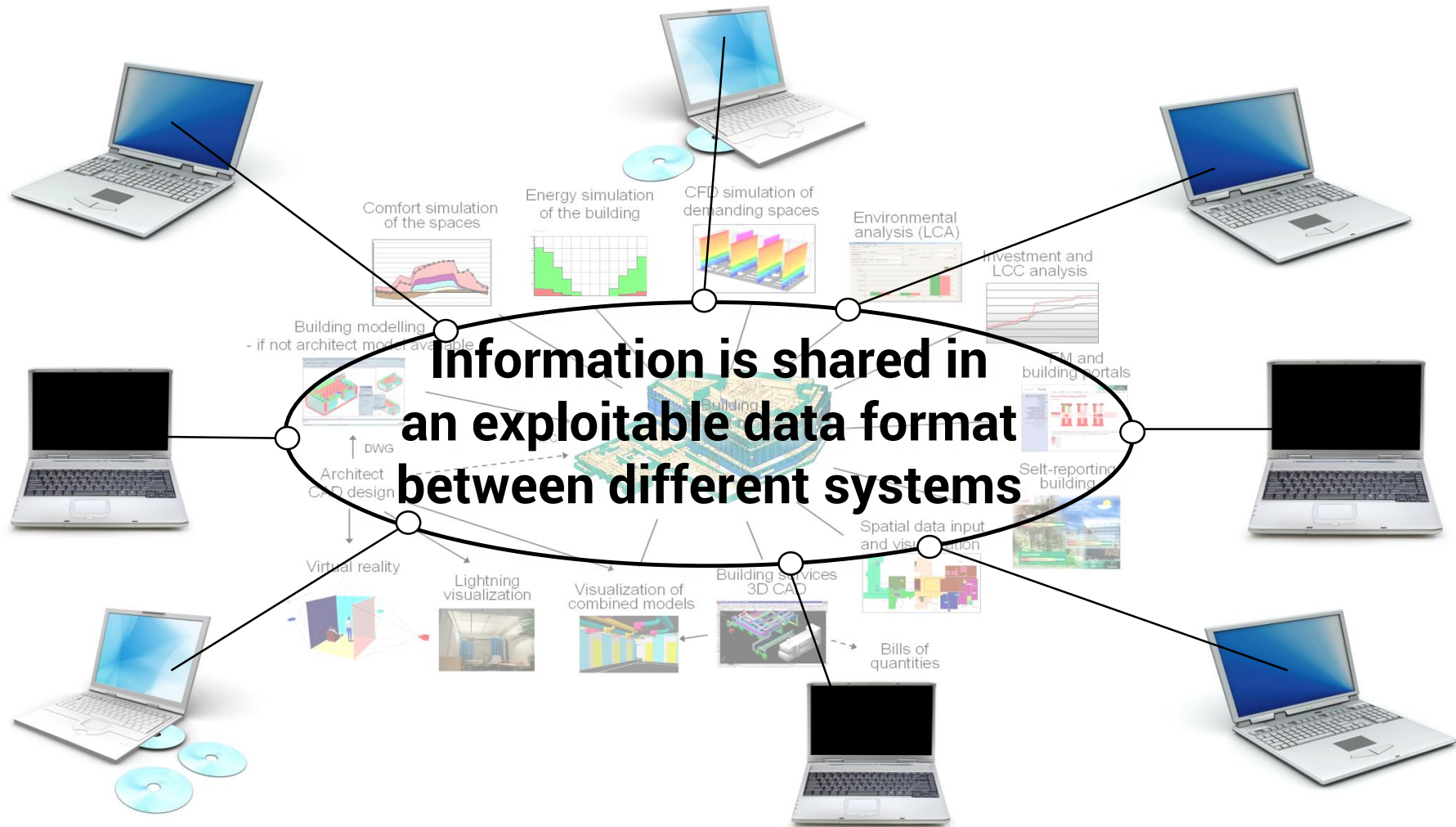
- Duration 5 years, in total 161 projects
- Budget €47 million – in a country of 5 million people

...tion work
 ...odels for buildings will
 al
 ...ware products
 ...ge and skills

Traditional document-based process 1997 – similar situation was described by Egan (1994)



Integrated BIM process



First integrated BIM project using IFC: HUT-600 (2001-2) vs 1st IPD project in USA (2006)

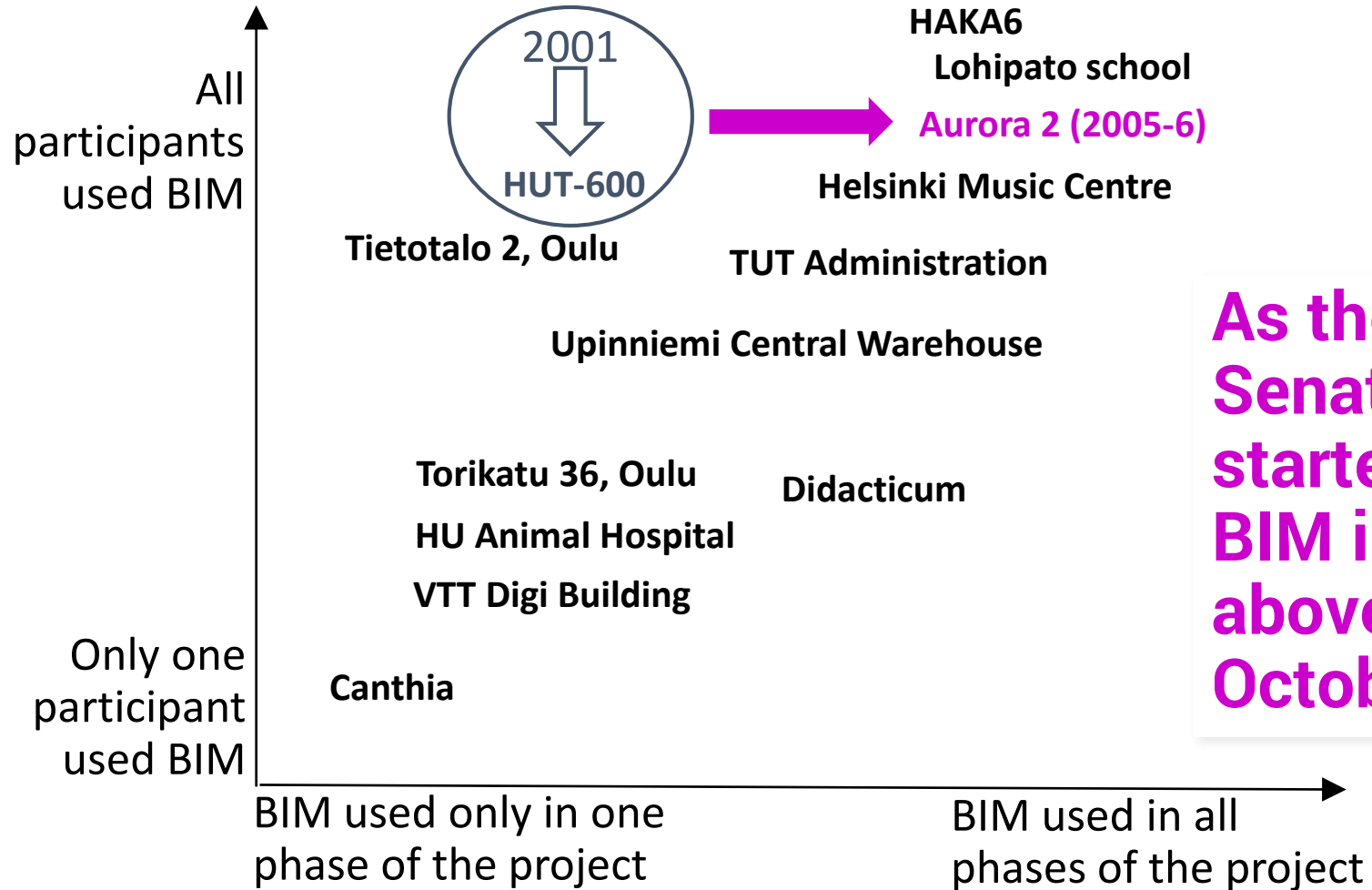


Report “Product Model & 4D CAD: Final Report” (TR143)
available at <http://cife.stanford.edu/node/325>



Martin Fischer and Calvin Kam / CIFE - Stanford University

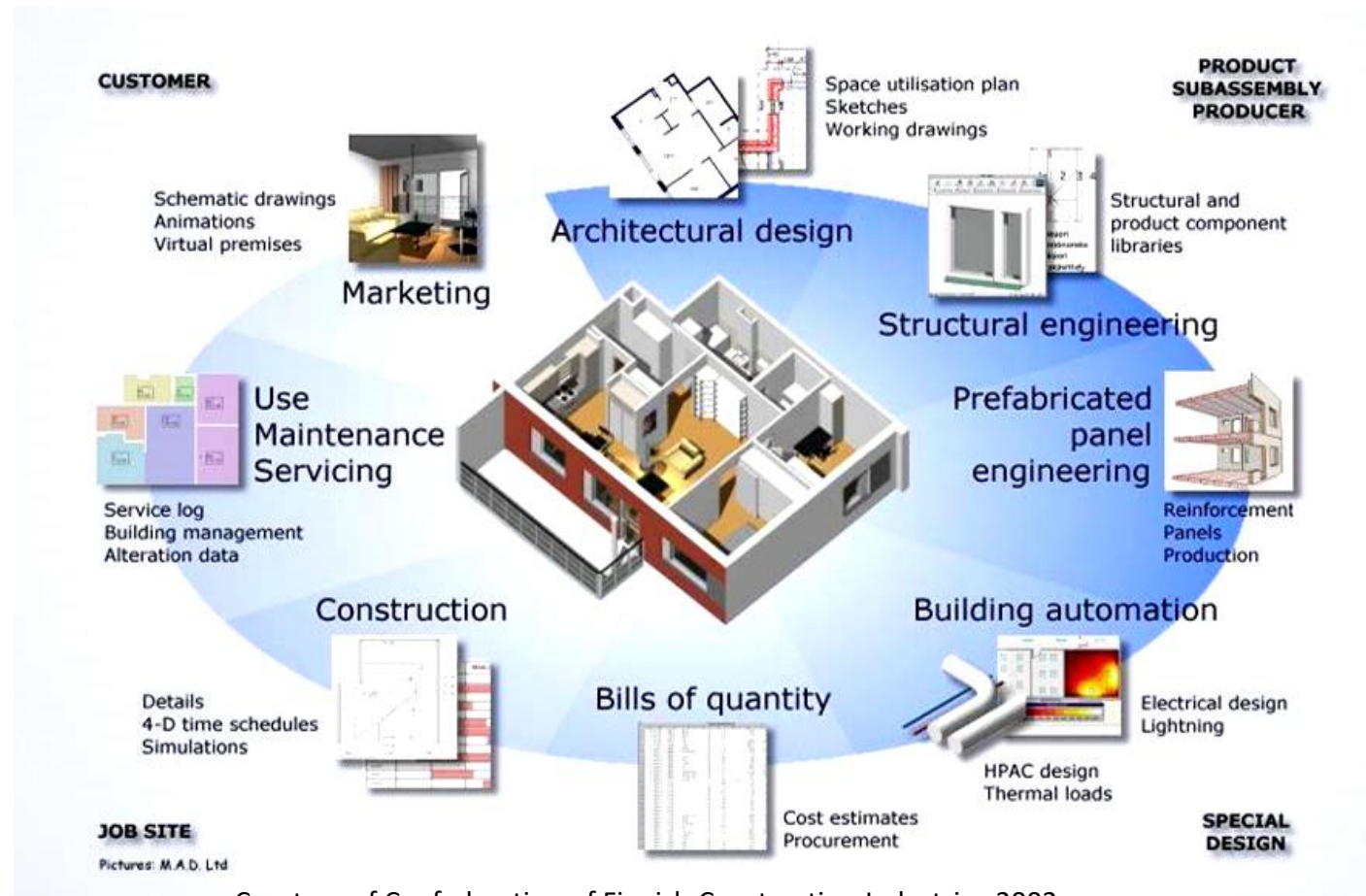
BIM pilots of Senate Properties 2001-2006



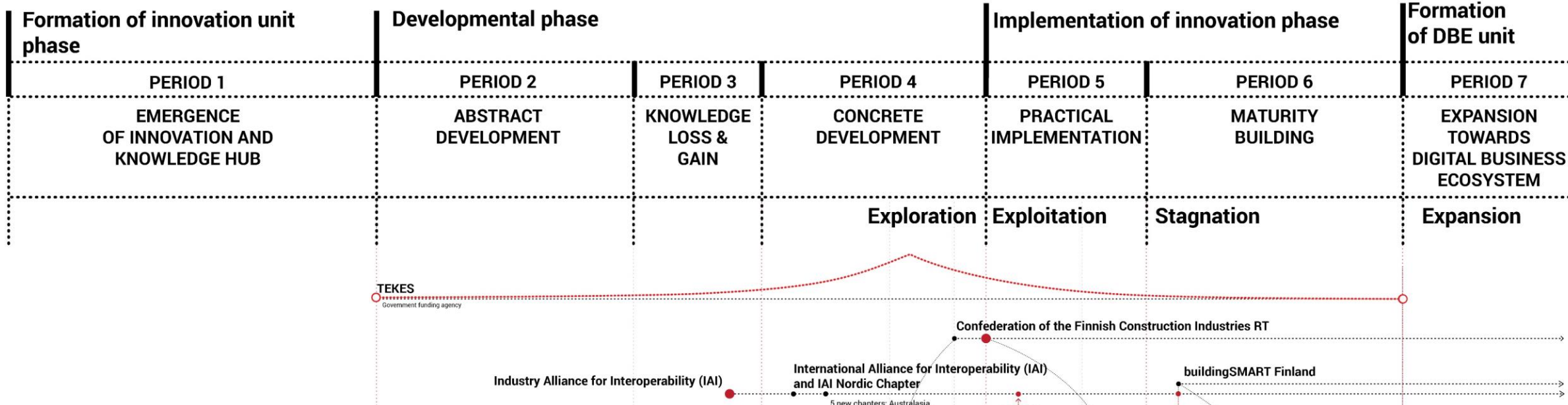
As the result of testing Senate Properties started to demand BIM in all projects above €1 million since October 1st, 2007

ProIT project - BIM in industry's technology strategy (2002-5)

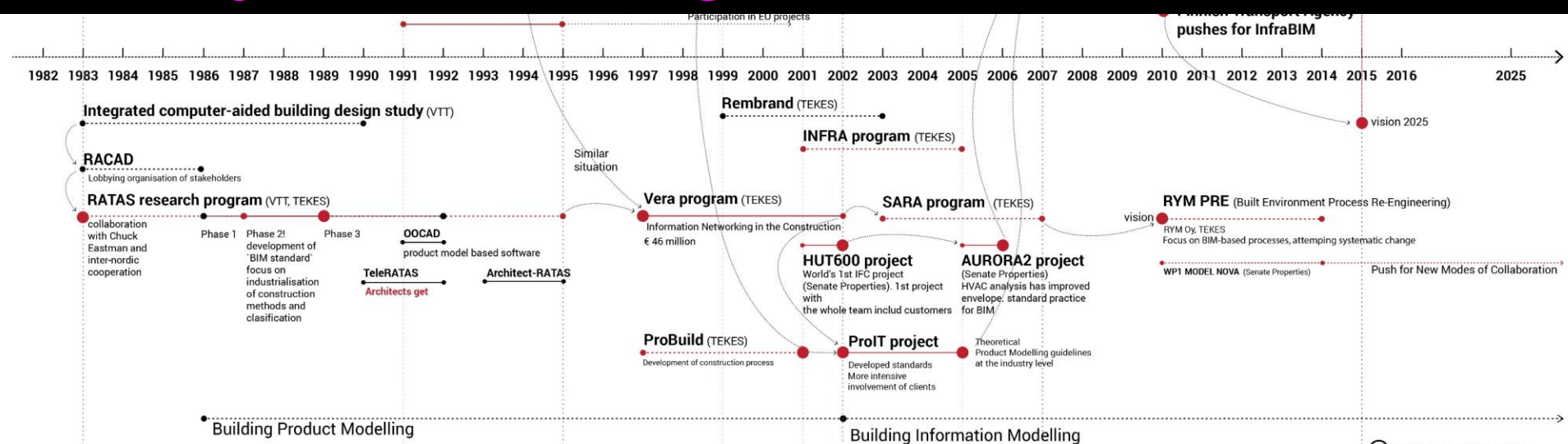
Result: First theoretical Product Modelling standards at the industry level



Courtesy of Confederation of Finnish Construction Industries 2002

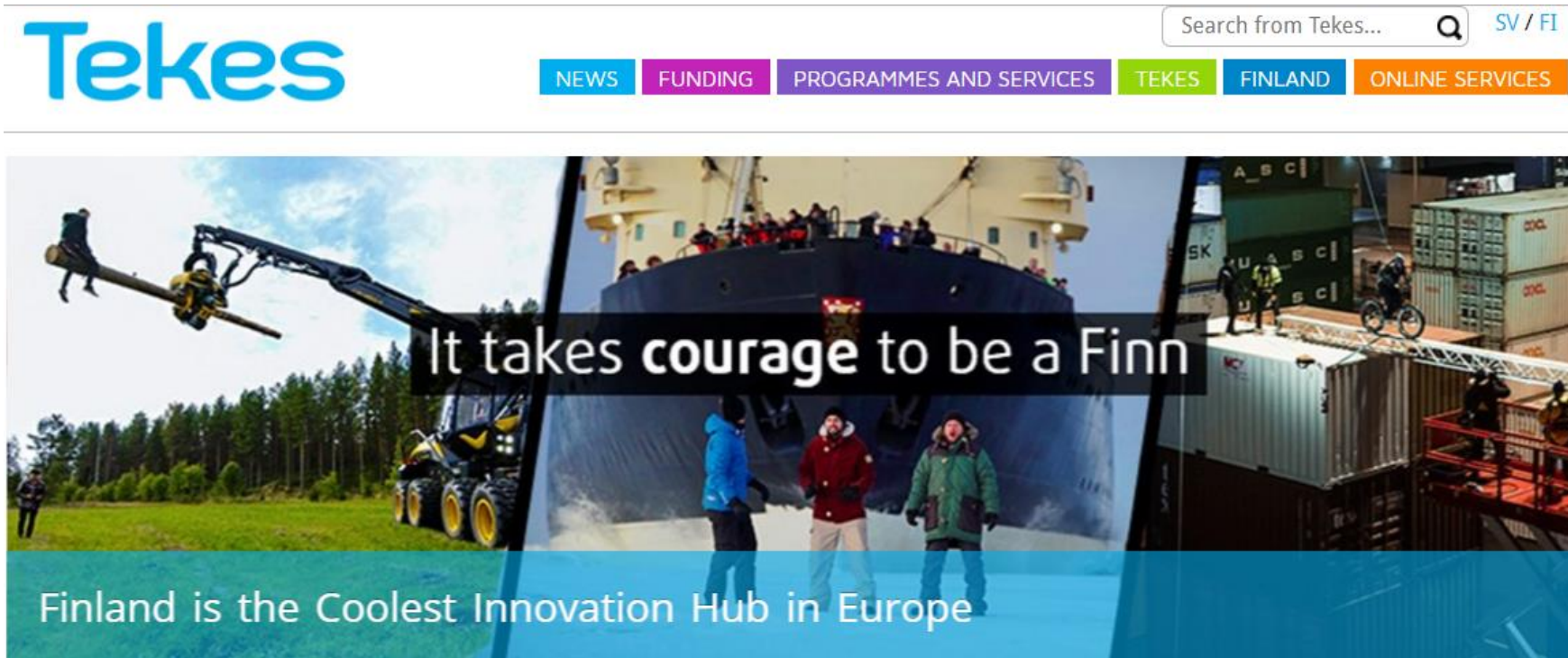


32 years of heavy investments in R&D of BIM technology
and yet, the industry has not changed its business models



**Lessons learned from the national
deployment of BIM in Finland
1965-2015**

Finnish Funding Agency for Innovation



Most of the nation's R&D expenditures were going to **technological developments**

**Knowledge
ecosystem**

**Business
ecosystem**





**Knowledge
ecosystem**

**Business
ecosystem**

**Focus on technological R&D and implementation
does not lead to a business transformation within the industry**

Business ecosystem strategy requires a powerful leadership that was not taken by the clients nor by the government

- As a consequence, there was no motivation to change the existing business models or to adopt new contractual and procurement models in the industry



You must continue to support us. **We cannot develop our business without additional funding!**

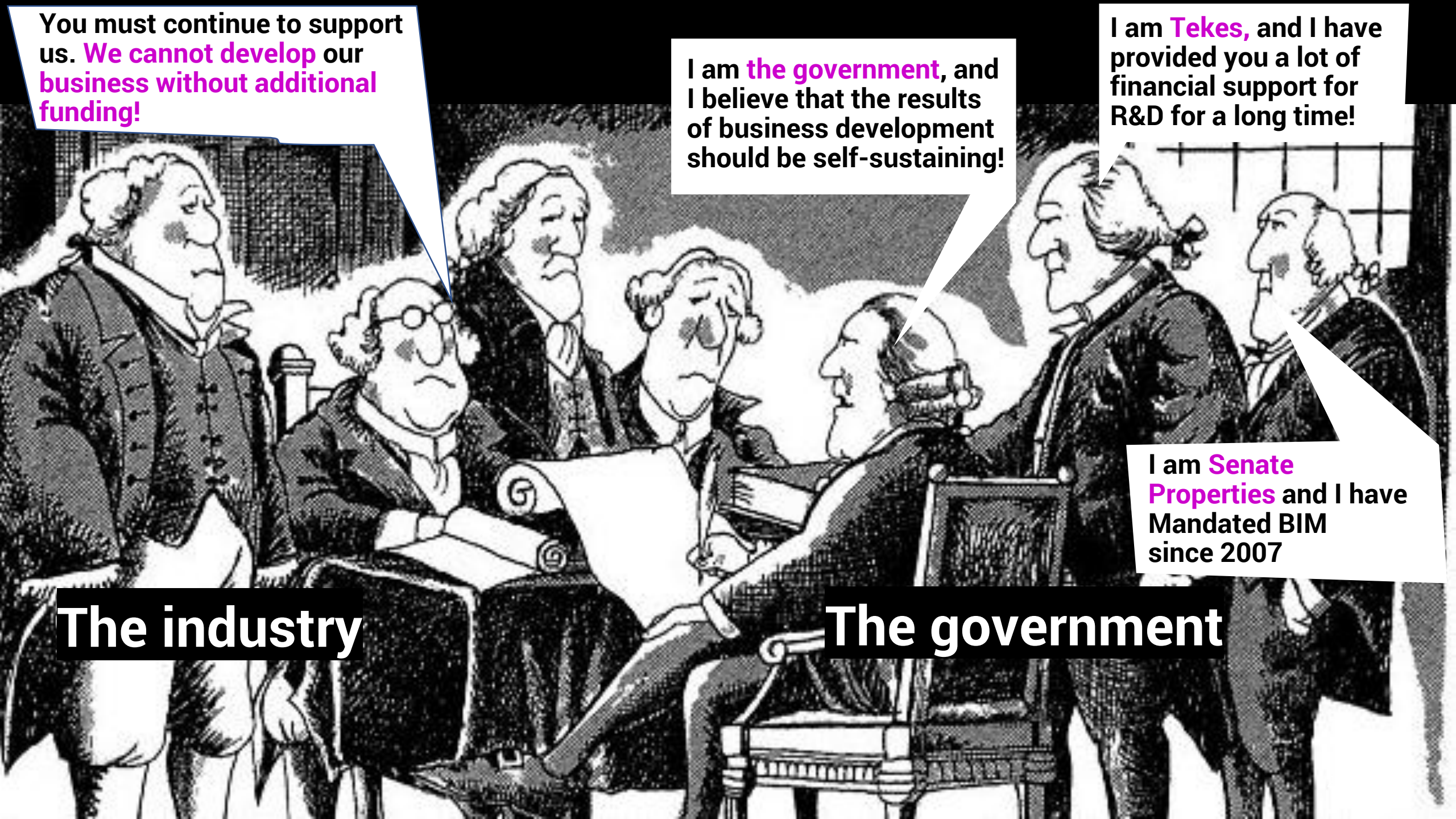
I am **the government**, and I believe that the results of business development should be self-sustaining!

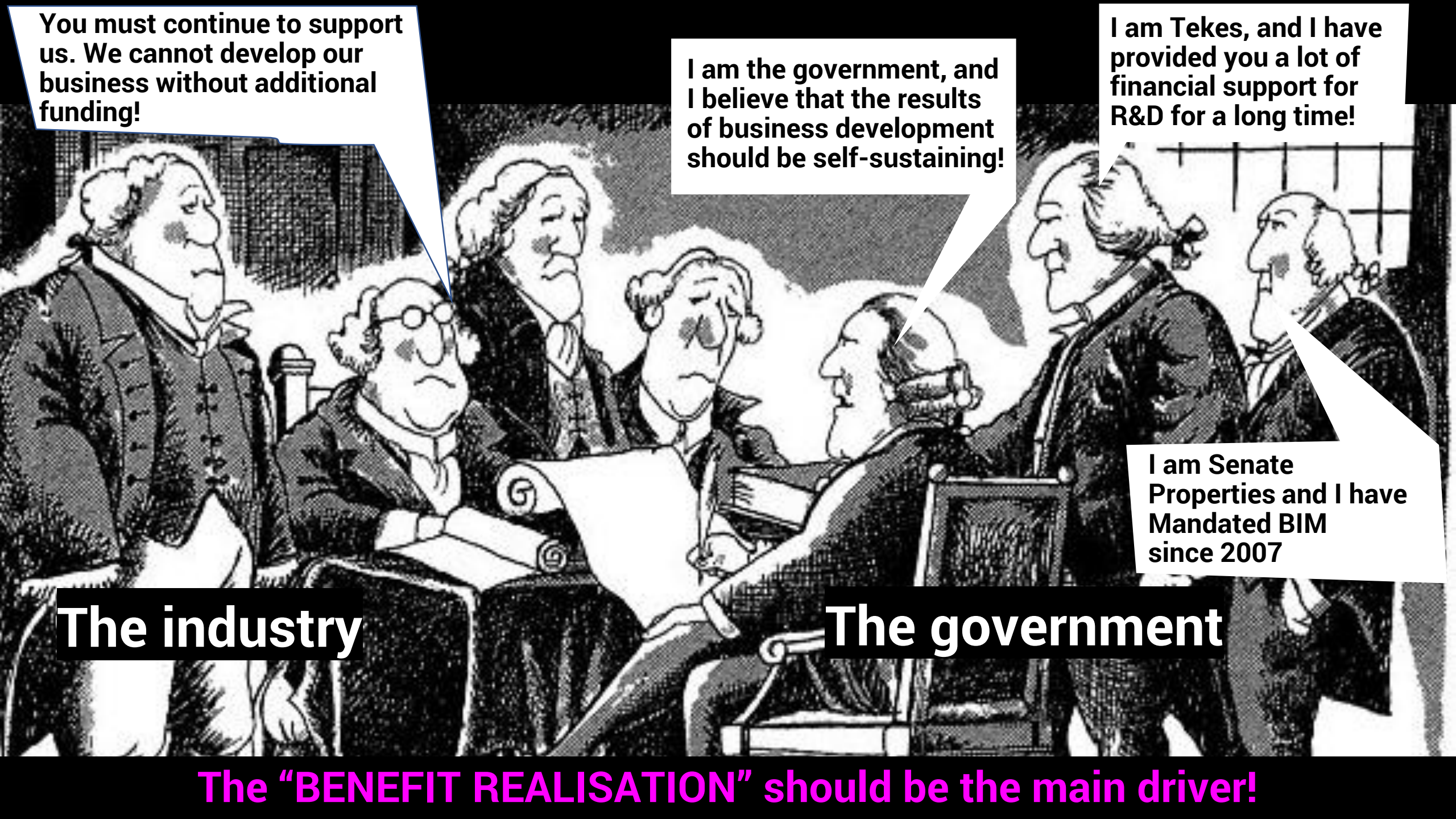
I am **TeKes**, and I have provided you a lot of financial support for R&D for a long time!

I am **Senate Properties** and I have Mandated BIM since 2007

The industry

The government





You must continue to support us. We cannot develop our business without additional funding!

I am the government, and I believe that the results of business development should be self-sustaining!

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The industry

The government

The "BENEFIT REALISATION" should be the main driver!

Finding 2. Public funding incentivises organisations to rely on public sector

- **TEKES was a driving force;**
- Finnish companies might also have configured themselves based on the **expectations of public funding at large;**
- Companies were competing on the national level instead of global level;
- **The local thinking** claimed to be hindrance for BIM adoption is possibly **a manifestation of incentives** that funding agency has provided as well as the nature of construction industry globally;
- The companies often mirror to priorities of their governmental **customers to rely on public sector for funding** when selling in international markets as well (Spencer et al., 2005).

Finding 3. Diminishing market diversity through the mechanism of public funding

“Market has changed a lot in last 5 years. Ramboll and Sweco are biggest and there are some other Finnish companies that have been merged together. **Small companies have almost disappeared from the market.**

They do not even have a possibility to enter the market because they cannot fulfil client demands.” (Quote_Fin23)

Finding 3. Diminishing market diversity through the mechanism of public funding

- Dainty et. al. (2017) predicted
 - **“BIM mandates serve those that hold already power in the market”**
 - Anticipate a strong separation between large and small organisations
- Evidence:
 - Finnish AEC industry is mainly operated by large organisations
 - **Public funding made it possible only for large companies to afford the necessary match funding.**

Finding 4. Commitment to unique in-depth technological knowledge distanced early adopters from traditional industries in Finland

- Finnish champions have developed strong digital capabilities –but **“Development was in silos”** (Quote_Innovation Manager)
- This condition has pushed for BIM development at the national level but possibly constrained the innovation diffusion on the long term;
- As a result: Champions have distanced themselves from traditional industries by virtue of their interdependencies

Finding 5. High levels of ideas diffusion versus established competencies

The quotes:

- “We are a small nation”,
 - “People move between organisations”,
 - “Everybody knows everybody”,
 - **“Four people can come together and decide the destiny of the country, I have never seen that in other countries”.**
-
- Finland holds social corporatist political structure (Garud and Karnøe, 2003).
 - The pre-existing relations are build on trusting relations (Taylor and Levitt, 2007).



The groupthink might have lead the managers to biased decisions amongst those that are in power and hold of resources.



The groupthink might have lead the managers to biased decisions amongst those that are in power and hold of resources.

How can we improve the collective intelligence of the industry?



**Those that hold the power of resources
are usually suspicious of new ideas**

(Van de Ven et al., 2008).

Finding 7. Leadership and management gains an increased importance in BIM adoption.

- Governments in general are less agile to fast-changing world.
- Managers can change firm's organisations much more easily and quickly than governments can change their institutional structures or requirements.



Finding 7. Leadership and management gains an increased importance in BIM adoption

“TOP MANAGEMENT WAS NOT READY TO SHARE BUSINESS IDEAS”



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“SHOCK”		“SHOCK”					
	EXPLORATION				EXPLOITATION		

Finding 7. Contractual relationship and business models have not changed until recently

**“BUT CHANGING CONTRACTUAL RELATIONSHIP
IN THE CONSTRUCTION SECTOR SEEMS LIKE IMPOSSIBLE!”**

(Quote_Research Scientist)



“ENGINEERS AND ARCHITECTS ARE NOT FRIENDS”

(quote_BIM user)

“THEY HIDE BEHIND CONTRACTS”

(quote_Manager)

Finding 7. Contractual relationship and business models have not changed until recently

“Many people believe that to break this contractual barrier, there is only one solution to make owners to put these requirements.

The problem is that **the owner himself doesn't need it. But the structural engineer and contractor, they need it. They do not have a contract** with the architect, so why would architect serve contractors and the engineers, I left a client who requires it and there is no point. But this is an early problem and **we realized it in early 80s already.”**

(Quote_Fin20)

**BIM technologies
were implemented
under the old ways of
doing things**

(Miettinen & Paavola, 2014)

“Everybody wanted to use BIM
but they wanted to use it
exactly the way they had
always worked.” (Quote_Fin07)

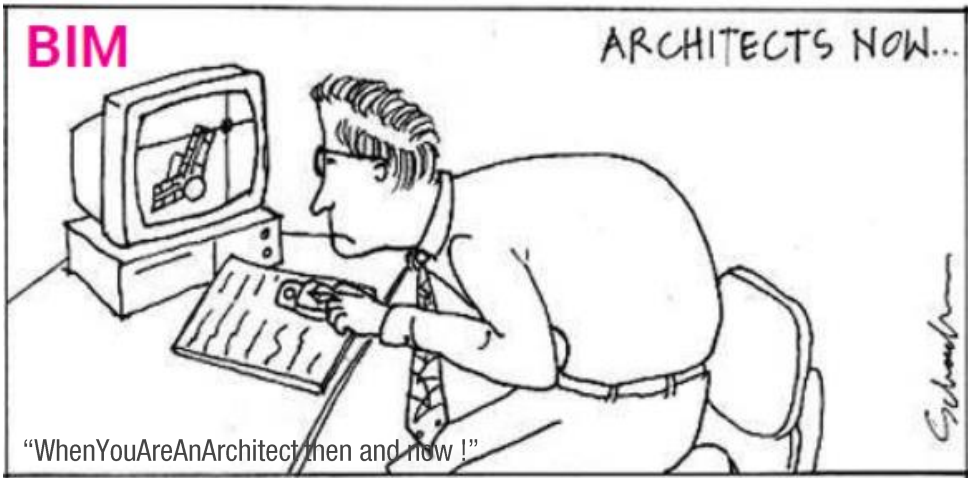
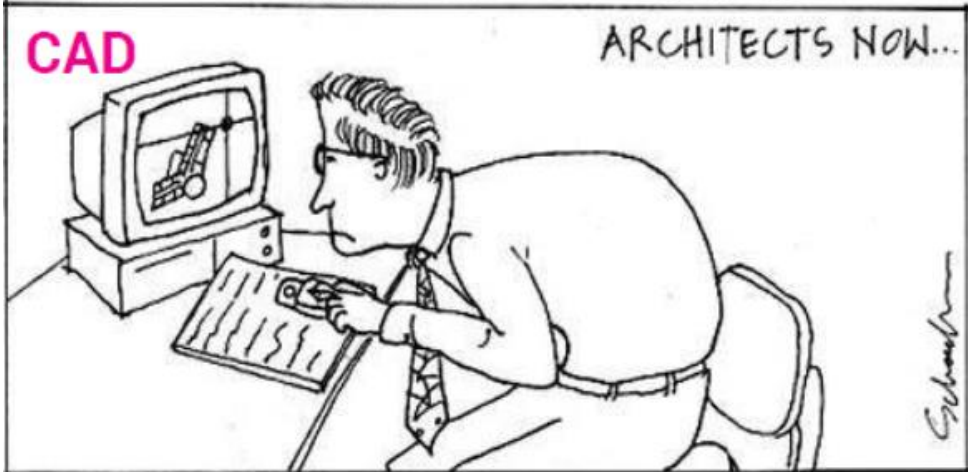
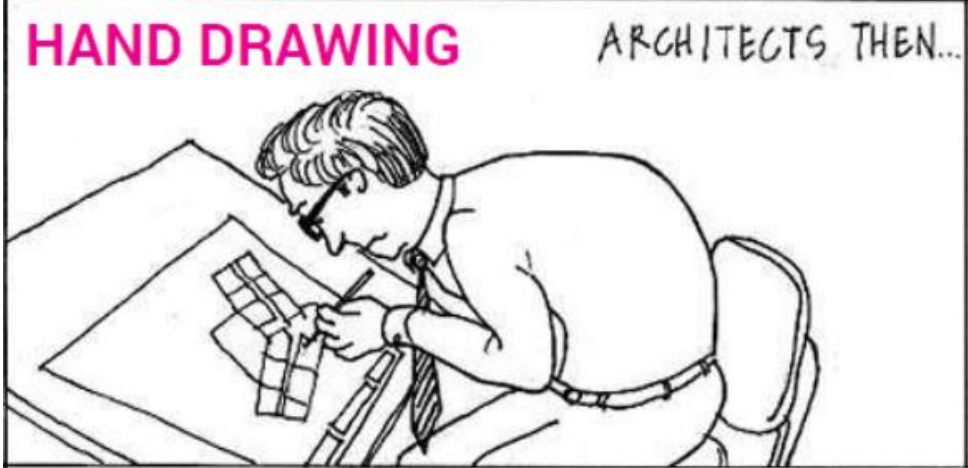
<1990



1990



2010>



Mismatch of skills and old problem “attitude”

“**The challenges are people again.** Some are very conformable with the new technologies and some are not. [...] **It is hard to get the team so that everybody is at the same level because people are at different levels at this moment [sic]**”

We do not want to make [sic] any punishment if you are not a BIM expert.” (Quote_Fin09)

Finding 8. Governments are advised to mandate BIM at the national level

“IF IT IS MANDATED, THEN EVERYBODY DOES IT”

(Quote_BIM user).

Finding 8. Governments are advised to mandate BIM at the national level

Contradiction

IF “EVERYBODY KNOWS EVERYBODY” and

“the RELATIONSHIP IS BASED ON TRUST”

WHY DO WE NEED TO MANDATE BIM



Lack of effective strategy for diligent change management in Senate Properties



Of course I promise to use BIM to get the project

Mismatch between the strategy and the reality of implementation



But if I get the project, I don't use BIM unless someone forces me to...



Lack of direct evidence

Are the projects implementing BIM successful because of BIM or for some other reasons?



Senate Properties

- Senate Properties had a well-established system in place based on 2D electronic documents and it would **require a systemic change to move the data into a BIM based system.**
- Senate Properties did not invest enough into a personnel
- Senate Properties was the only client that have mandated BIM. Cities and owners have not been very active.
- A vision for **the BIM business value for the clients remains unclear**
- **As a result, Senate Properties did not take a leadership role to create a business ecosystem.**

Finding 9. Mismatch between business model of software market versus BIM-driven innovation for the clients

- **Software market is changing faster than the internal processes in FM.** Senate Properties is questioning whether they will be able to use the same models in ten years' time.
- The problem is **the lack of agreement on how the attributes in the models should be presented** as the software have proprietary ways to present these attributes (Henttinen, 2017).

IFC

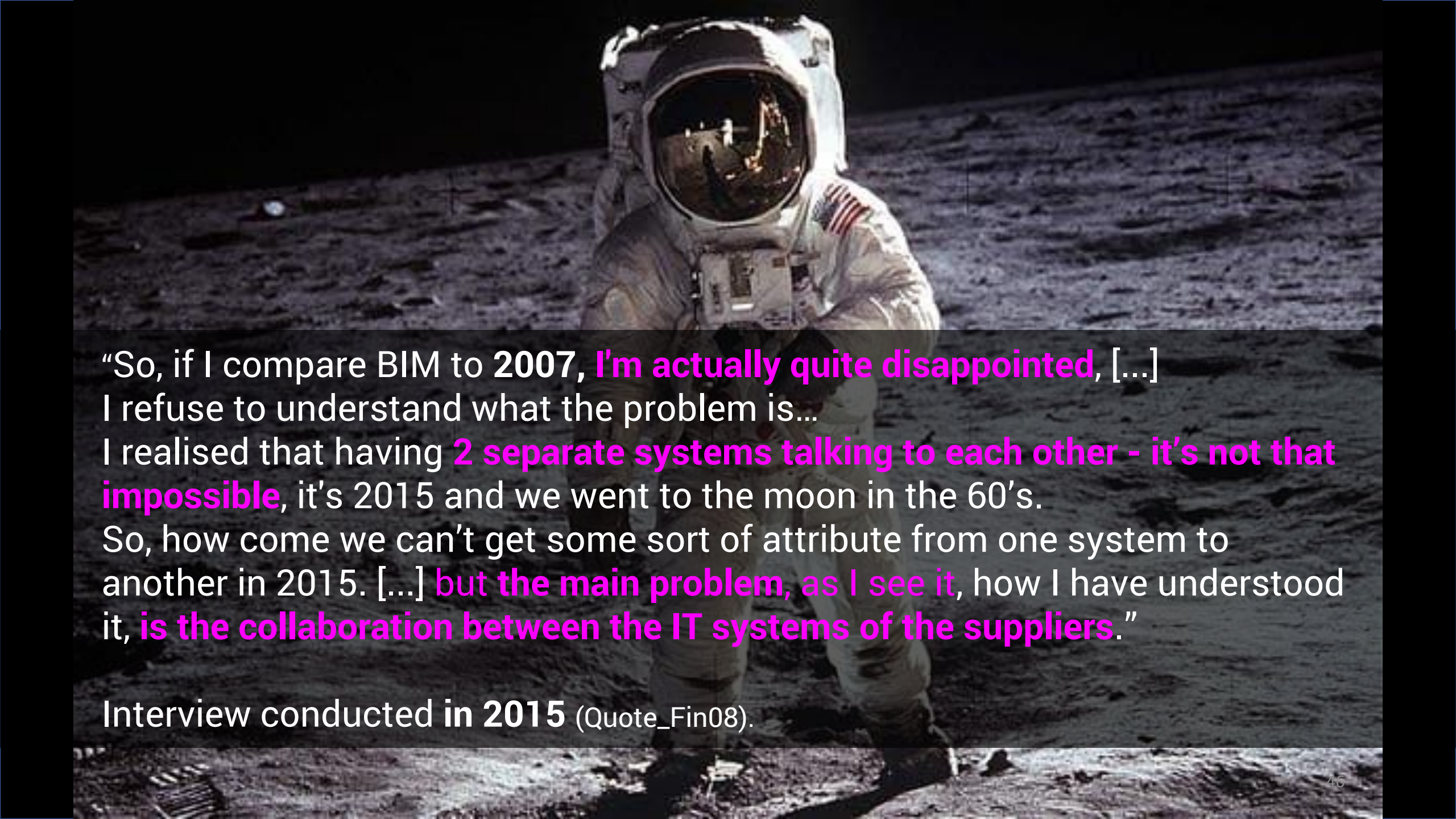
The only workable solution to integration problems?

International Alliance for Interoperability (AIA, renamed BuildingSmart in 2008) was established by 12 large international companies in 1994

To set the unified standards to end the Babel paradox in the industry



(the end of Babel, IFC promotional video by James Burke in 1994)

A photograph of an astronaut in a white spacesuit standing on the moon's surface. The astronaut is wearing a helmet with a reflective visor. The background shows the dark, cratered lunar landscape under a black sky. The astronaut's shadow is cast on the ground to the right.

“So, if I compare BIM to 2007, **I'm actually quite disappointed**, [...] I refuse to understand what the problem is... I realised that having **2 separate systems talking to each other - it's not that impossible**, it's 2015 and we went to the moon in the 60's. So, how come we can't get some sort of attribute from one system to another in 2015. [...] **but the main problem, as I see it**, how I have understood it, **is the collaboration between the IT systems of the suppliers.**”

Interview conducted in **2015** (Quote_Fin08).



**23 years of IAI and
the Babel paradox is still relevant**

<https://www.buildingsmart.org/about/about-buildingsmart/history/>

International software market is oligopolistic in nature

- Large software companies have “a disproportionate control over the terms of market competition, by not only setting prices but manipulating product quality in ways that are privately profitable but not socially efficient.” (David & Greenstein, 1990).
- Consumers usually are reluctant to try and use software that is not compatible with the mainstream products, even if they offer competitive price and quality;
- Creates perception amongst the users that BIM does not offer enough value to invest in, although, the benefits of BIM are evident (Miettinen & Paavola, 2014).

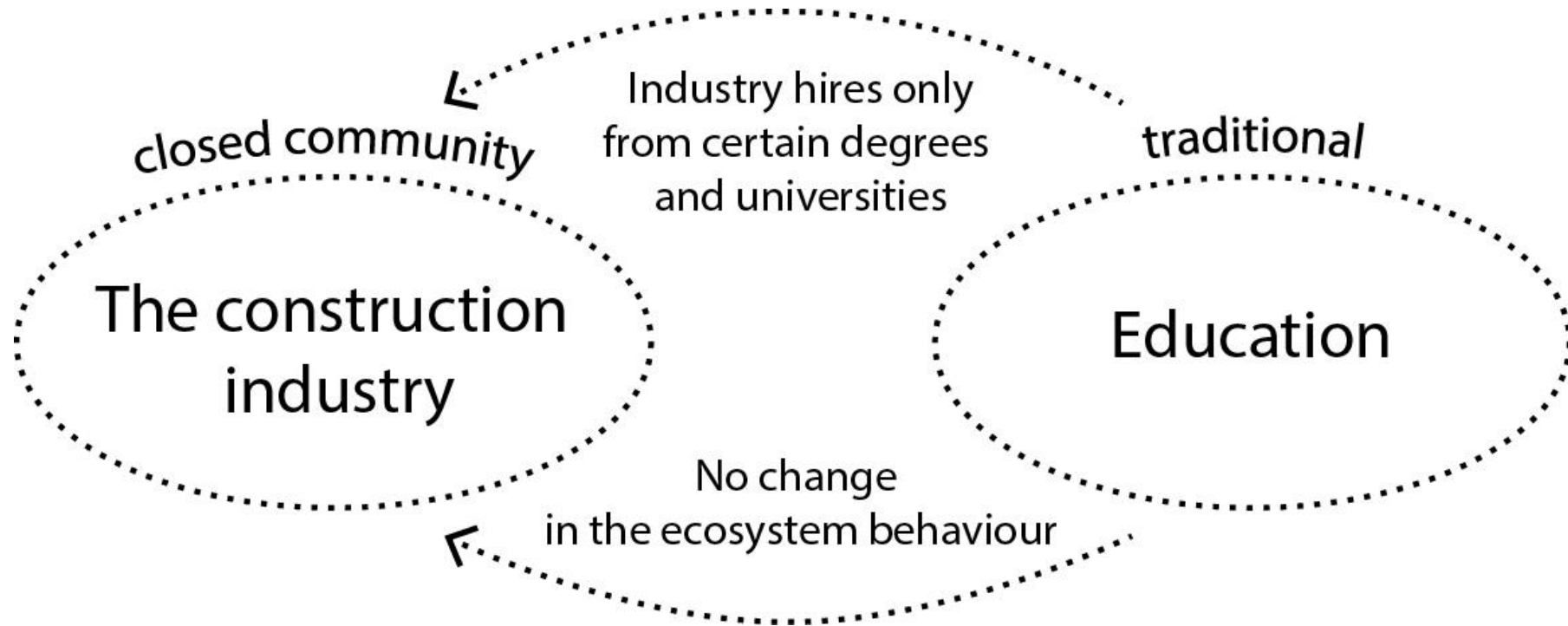
What is the real commitment of software vendors to implementing IFCs and other standards?

- **Software vendors are a key element in BIM** and, where they have implemented IFCs, they should state their real commitment and to what level these have been tested. (Howard & Bjork, 2008)
- By denying their liability of the technical quality of data the software providers are inhibitors **by increasing risks that clients take**, and thus diluting the benefits of the BIM adoption (Mosey et al. (2016).”
- **Open standards must be supported by the clients, industry bodies and the government**

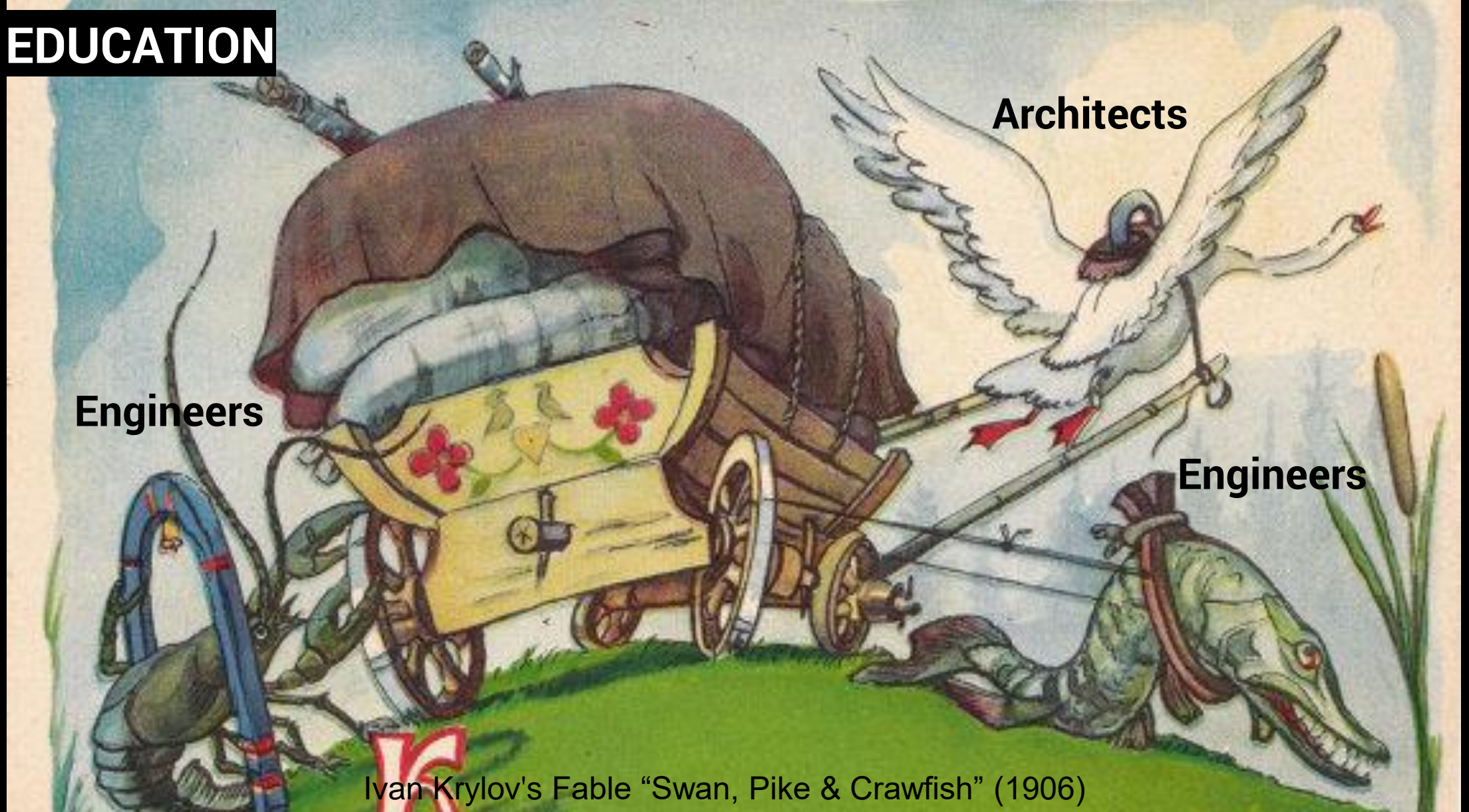
Finding 10. AECO education does not give enough competences for business development and necessary engagement between specialist teams

- Focus on the **traditional technical skills**
- Does not give competences for business development and leadership
- **Marketing ability** is also seen as a missing skill
- Students entering the Finnish construction market has decreased - **Lack of BIM managers and coordinators**

The boundaries of established communities in the industry were kept **strict** which has **diminished** diversity and **collective intelligence**

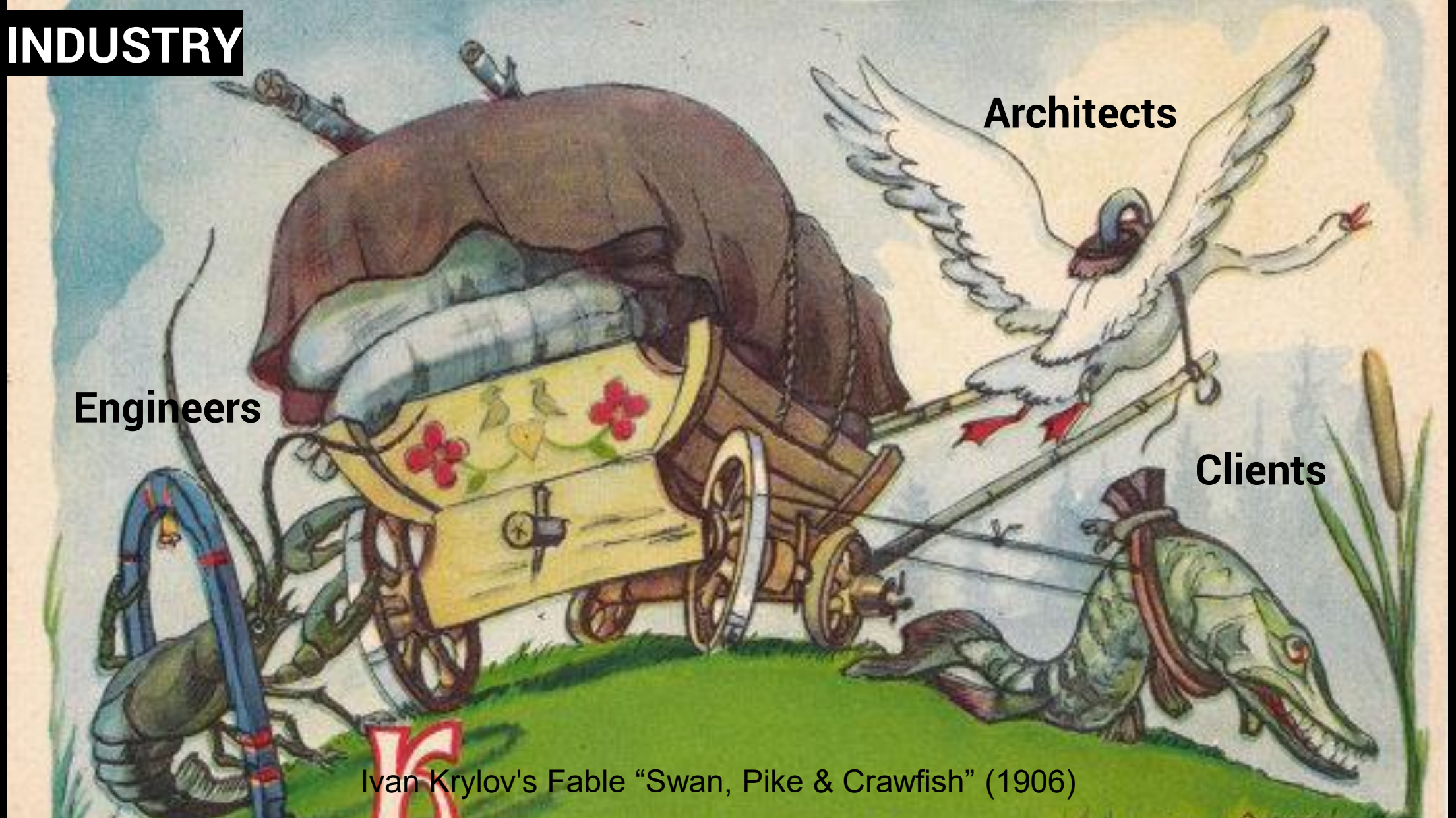


EDUCATION



**Limited engagement between specialist courses in the universities.
Notion of "US and THEM"**

INDUSTRY



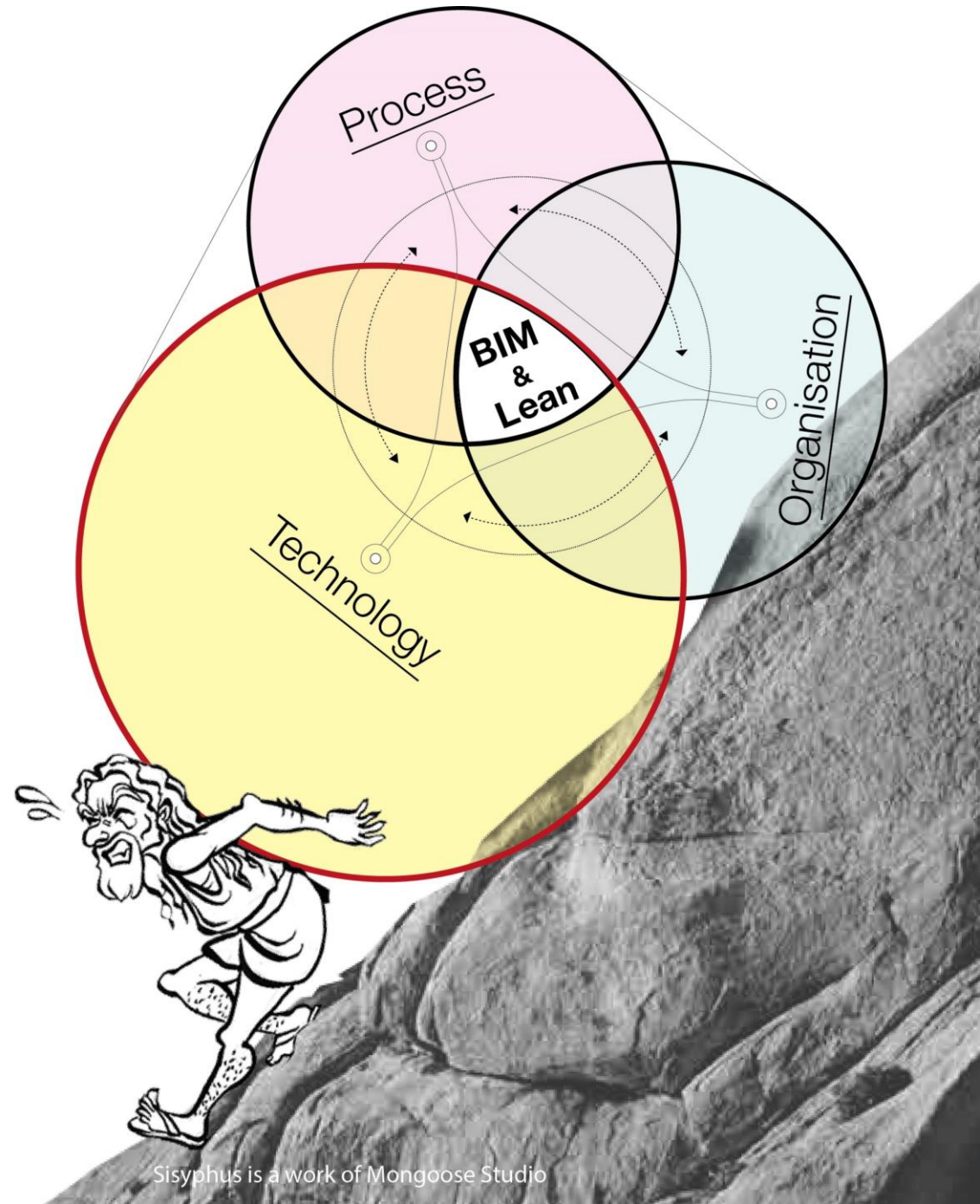
Ivan Krylov's Fable "Swan, Pike & Crawfish" (1906)

"MAKING PEOPLE TO TALK AND UNDERSTAND EACH OTHER SEEMS LIKE IMPOSSIBLE!"

(quote: Innovation Manager)

The question is **NOT** about
the technology!

Technological vision does
not necessarily lead to a
business development!



Reasons for why knowledge ecosystem did not lead to a business ecosystem strategy

- (1) Tekes, with a technology vision, has incentivised the industry actors to **rely on the public funding for a business development** instead of seeking other strategies;
- (2) **Business ecosystem strategy requires a strong leadership** to establish a strong vision for a business transformation and a capability to lead the change. Such leadership role was neither taken by the government nor by the clients until 2016.
- (3) **Lack of participation of the necessary actors** on the supplier side, such as owners, cities, academia and complementary industries. There was no interdependency or co-evolution between any of the participating actors.
- (4) **Lack of understanding of the business value BIM-adoption** could bring for the clients and end-users until recently;
- (5) Despite a wide adoption of BIM in Finland, the AECO firms only recently started to **recognise a need for new contractual, procurement and business models.**

Technological development at the national level has produced success stories:

- 1) some Finnish software developers, e.g. **Tekla, Progran, and Solibri** created successful business ecosystems by partnering with global key players in a software market;
- (2) BIM has been developed and implemented successfully as a **"productivity tool" for individual leading organisations**;
- (3) the long-established incumbent MEP company **Granlund** and the challenger general contractor, **Fira**, have become successful examples of Finnish companies with **service dominant logic and client-centric business models** based on BIM even though the external environment was not supporting BIM-adoption (most clients were not demanding BIM).

Recommendations to Quebec from Finland

- Clients and cities are very powerful drivers - **Mandate Open BIM in all public projects**. Create guidelines like CoBIM 2012
- Focus more on life cycle – what is the business of owners?
- **Contracts, procurement and business models** have to be central to the discussion - Look at **rewarding mechanisms** such as in IPD. Lowest bid is a real problem.
- **Address liability issues of software vendors** to enable a more efficient information exchange
- Safety issues is a neutral topic that can unite people and enforce cooperation
- **Gap between academia and industry** is growing. Academia is too theoretical. Invest in training and upskilling of existing stuff
- Funding for R&D can accelerate the change
- Start pilot projects – start showing off
- You must have champions – usually they are the small companies and are very innovative
- Mobile technologies are adopted faster on site
- **Adopt business ecosystem view** by activating various stakeholders across built environment and complementary industries

Second Wind: Development of Open Digital Business Ecosystem

After 35 years of innovation journey,
There is a new wave of emerging activities
for expansion of business services By enabling cross-border mobility



Concepts	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7
Time periods	1960-1983	1983-1990	1991-1995	1997-2002	2003-2009	2010-2014	2015>
	ICT development supported financially by TEKES (1983-2015)						
Programs		RATAS	Depression	Vera	Sara	RYM PRE	KIRA-digi
Focus	Innovation	Theory	R&D	Tools & Process	Business	Process	Digital Business Ecosystem
	Exploration				Exploitation	Stagnation	Expansion
Phases of development	Formation of Innovation Unit period	Developmental period			Implementation of innovation period		Formation of Business Ecosystem period
Names of periods	Emergence of Knowledge Hub	Abstract Development	Knowledge Loss & Gain	Concrete Development	Practical Implementation	Maturity Building	Emergence of an Interdisciplinary Mediator
			"SHOCK"				



AEC-Business.com

14th October 2016 15:04

Government-backed #KIRAdigi program aims to create an open IM ecosystem for the built environment in Finland starting today. Teemu Lehtinen is the Chief Digital Officer. All the best to KIRA-digi and Teemu!

Questions are yet to be answered

1. Who can take a **leadership** role in an AECO business ecosystem?
2. What is the **role of academia** in the business ecosystem?
3. What is the overall **role of the public sector** in business and innovation ecosystems?



Corresponding author is Gulnaz Aksenova.

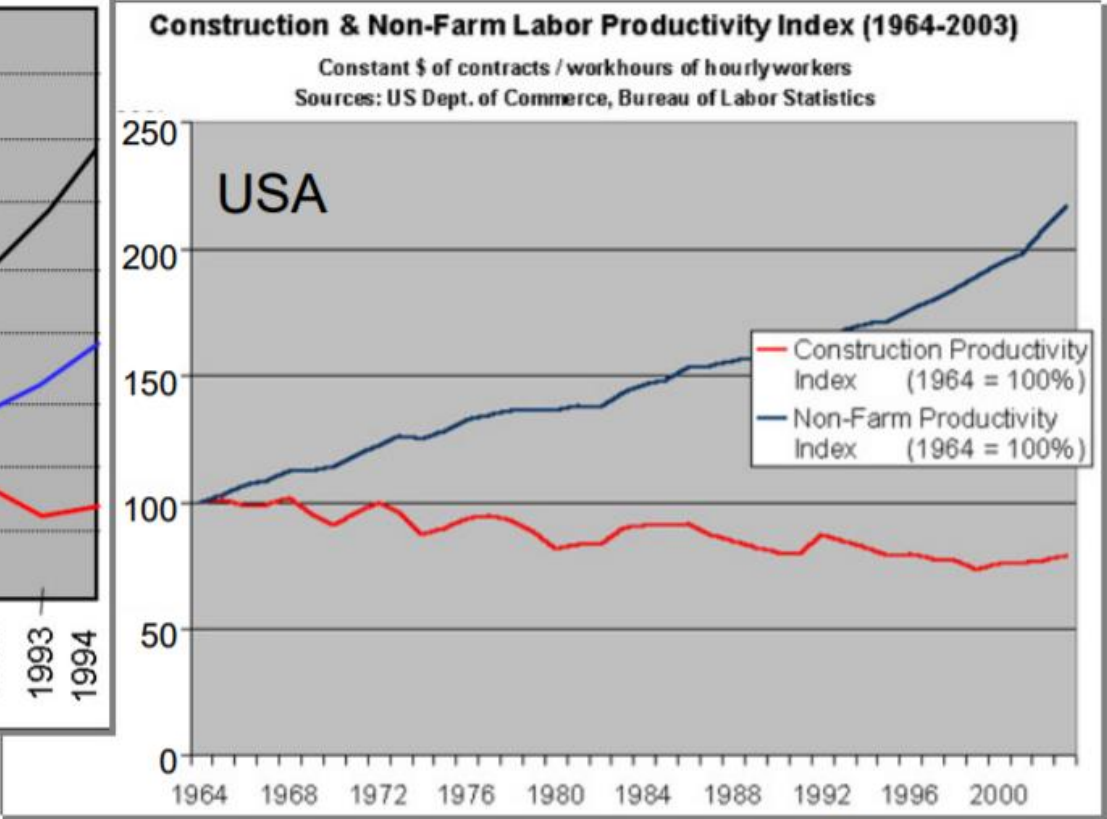
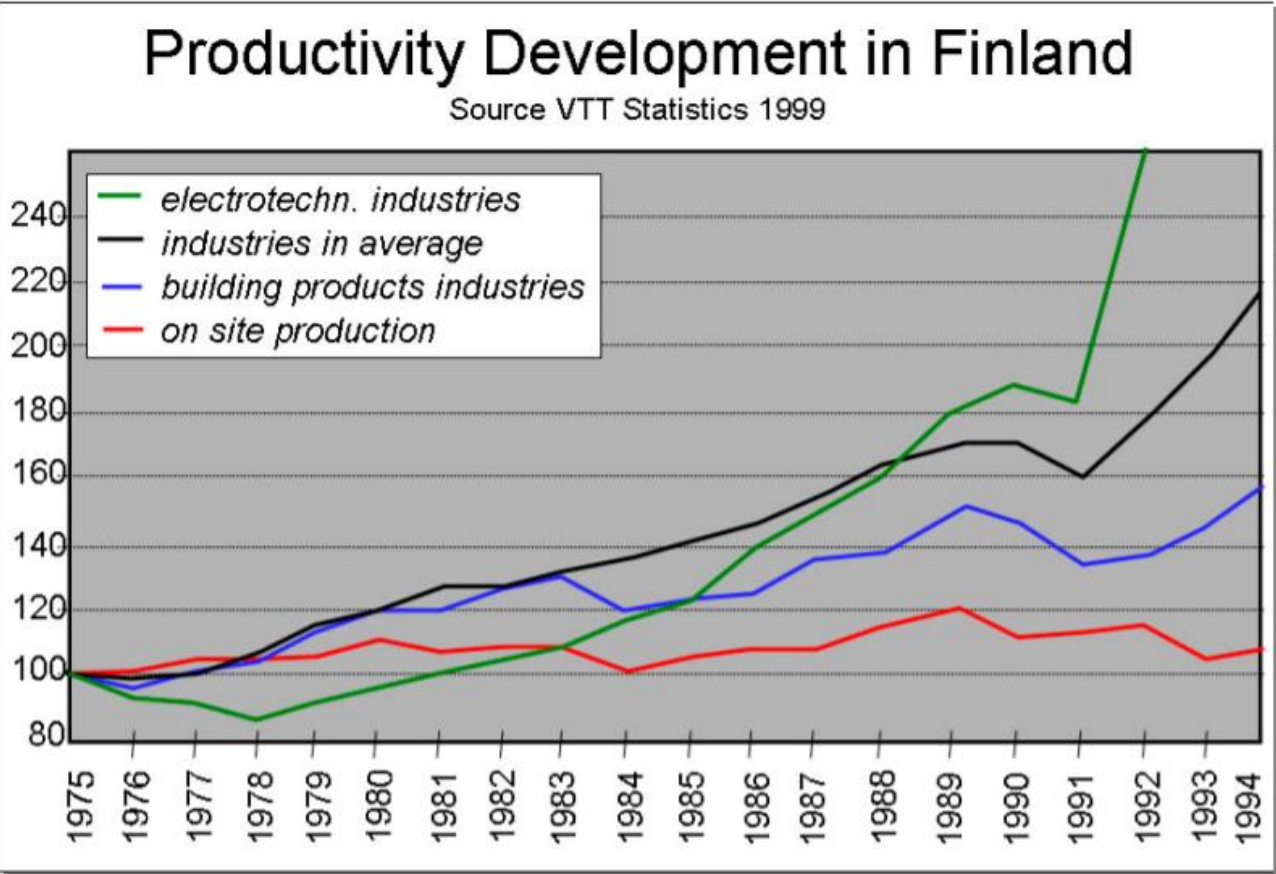
Email: Gulnaz.aksenova@liverpool.ac.uk

The business ecosystem concept in innovation policy context

(Rinkinen & Harmaakorpi (2017) research is funded by Tekes)

- What is the overall **role of the public sector** in business and innovation ecosystems?
- Should we even **try to influence business ecosystems with policy** instruments or should the ecosystem evolution **be left to be driven by the processes** of self-organization and self-renewal?
- What are the **essential policy mechanisms** needed to nurture existing and emerging business ecosystems?

In the last 40 years AEC industry has not been able to increase the productivity as the other industries



The industry recognised a need to adopt new business, contractual and procurement models to support a qualitative change towards BIM

“It was a focus on technology. Now we have to look at the business model and a change of business thinking. [...] it is the question of innovation.” (Quote_Fin14)

“There is an emerging **recognition by managers** themselves that **the foundations** of enterprise success **transcend** simply being **productive at R&D**, achieving new product introductions, **adopting best practice**, and delivering quality products and services.”

(Teece, 2007)

Starting Point

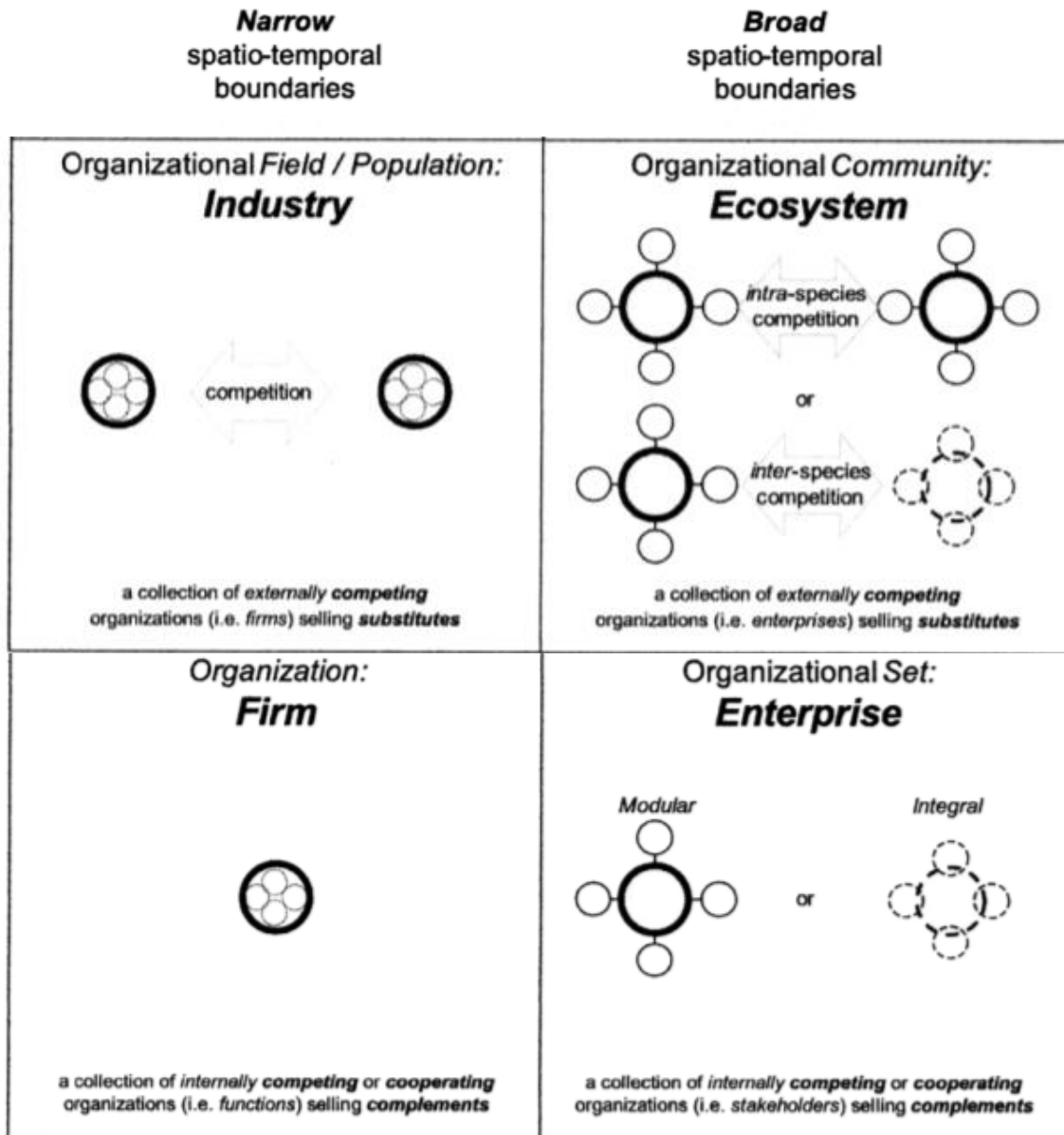
- “Organisations **never innovate in isolation** as there are various **external factors** that influence technological innovations” (Teece, 2010)
- “**The success of an innovating firm** often depends on the efforts of **other innovators** in its environment” (Adner, 2010)
- “The odds of **successful innovation** development for an individual firm are largely **a function of the extent**” (Van de Ven and Garud, 1993)
- “**No single firm has all of the required specialized knowledge and managerial resources necessary for the whole system.** Indeed, a substantial solution to a customer need may require the participation of dozens or even hundreds of diverse contributors, each of which is a master of fast-moving, complex and subtle developments in its own domain”. (Moore, 1993)

Pries and Janszen (1995) emphasised a dominant role of the environment that affects innovation process in construction

- Most of innovations in construction industry are **the result of individually operating enterprises with 75% motivation due to improvement of productivity.**
- While **50% of innovations are originating in other industrial sectors.**
- The innovators in the Netherlands that **paid attention to complementary assets** (service, special equipment, education) as well as to the product were very successful comparing to its competitors in UK and Germany that rather produced “imitation bricks”.

A need for further understanding of **how the environment** (market, technology, academia, government, suppliers of suppliers, clients and etc.) co-evolves with the industry actors and **affects innovation** and BIM implementation on the long run in the industry

Business ecosystem definition



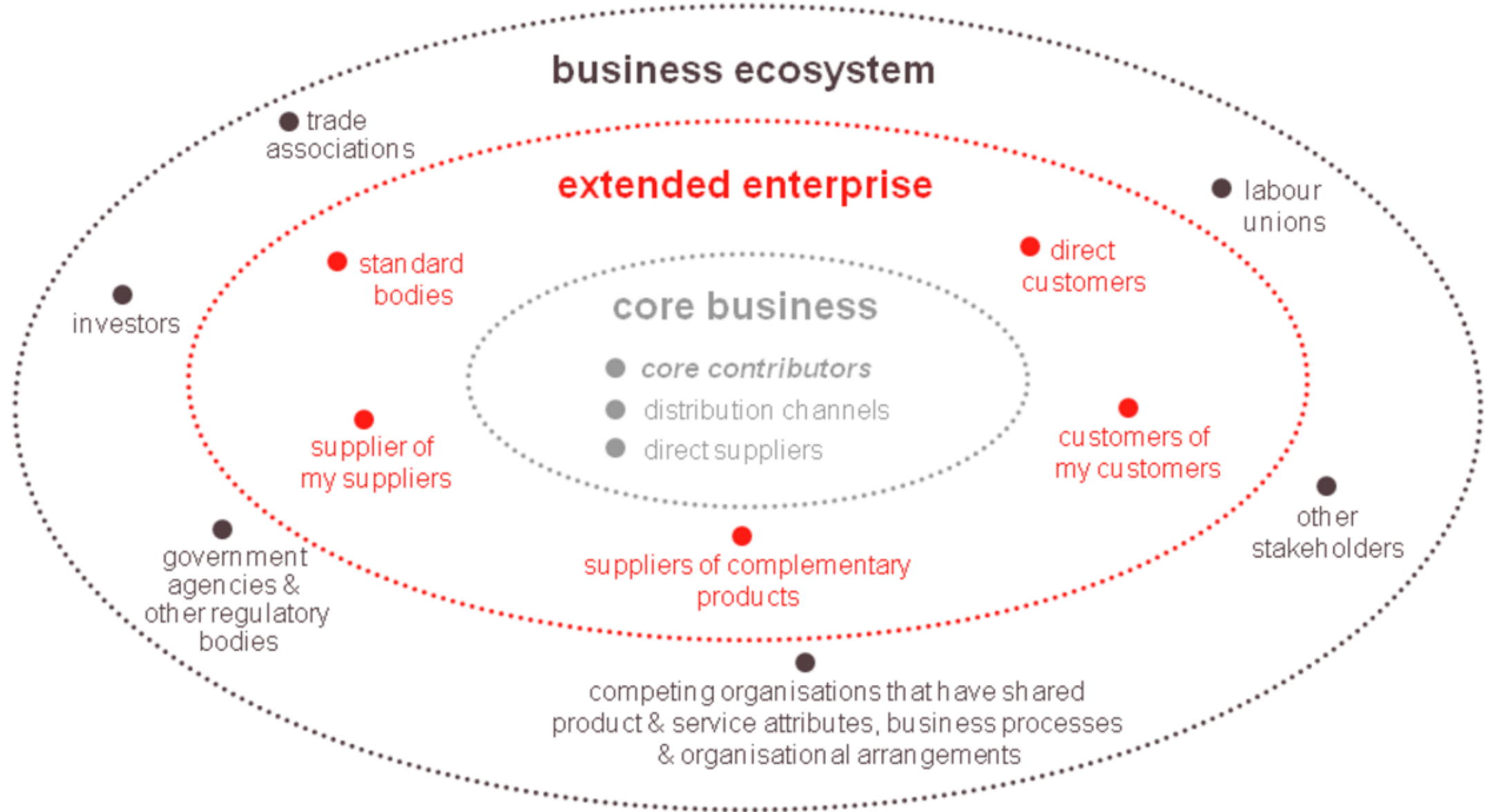
“Ecology approach to management, I suggest that **a company must be viewed not as a member** of a single industry but as part **of a business ecosystem** that crosses a variety of industries. In a business ecosystem, **companies coevolve capabilities around a new innovation.**”

(Moore, 1993)

and **tend to align** themselves with the **directions set by** one or more central companies - **keystones.**”

(Moore, 1997)

Business Ecosystem Actors



Ecosystem types

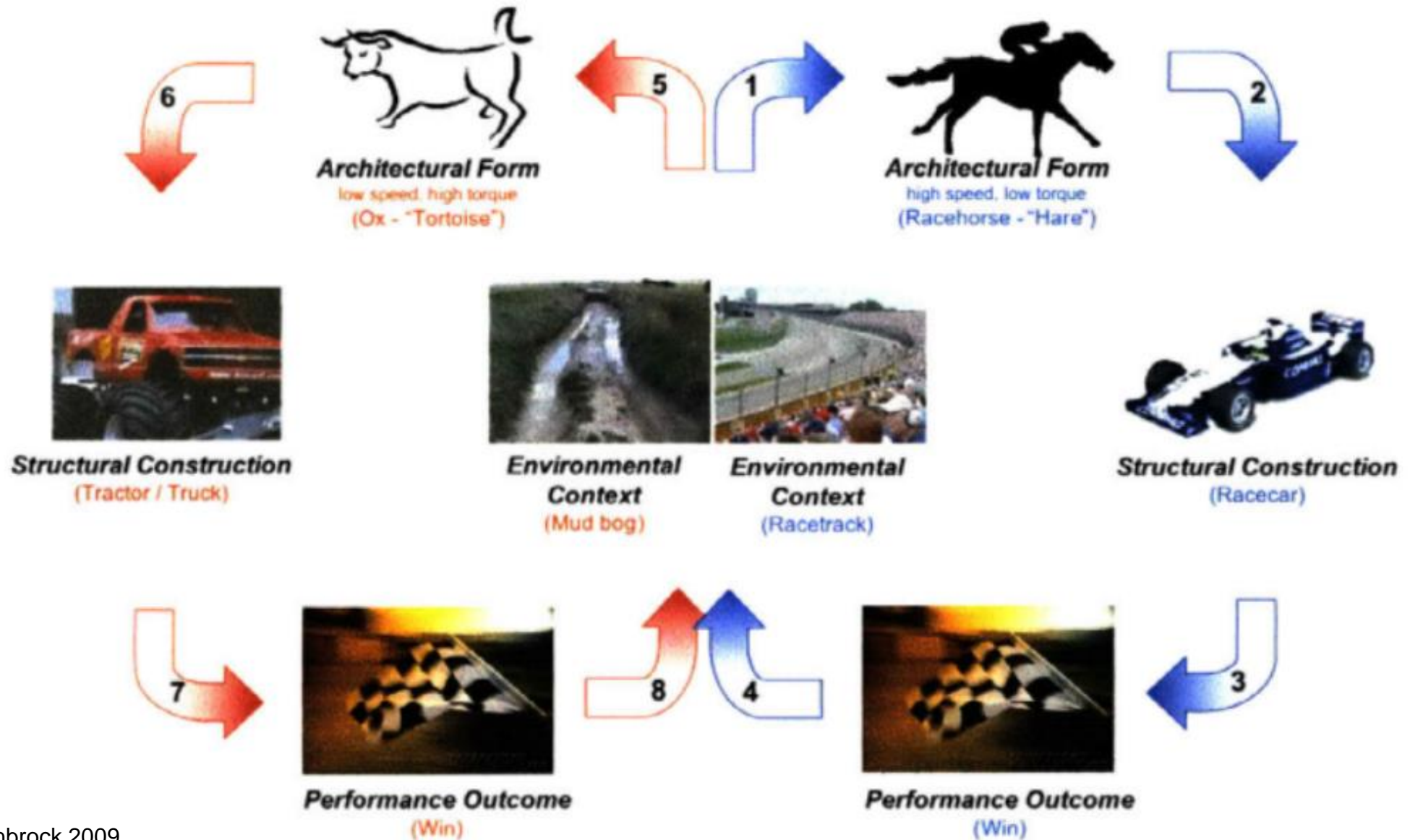
There are **various types** of the ecosystems:

business, knowledge, biological, digital, economy, industrial, innovation, social

Overview of differences between knowledge and business ecosystems

Factor	Knowledge Ecosystem	Business Ecosystem
Focus of Activity	Knowledge generation	Customer value
Connectivity of players	Geographically clustered	Value network
Key Player	University or PRO	Large company

The research is agnostic: No best strategy to excel in all situations



Main Results of the Vera programme

Wide adoption of BIM as a part of AEC industry processes and strategy

- Industry consensus about the importance of ICT and about the role of BIM
- The industry recognised the central role of information management to improve productivity, quality and processes
- This was at that point, 2002, globally quite unique situation

International Networks

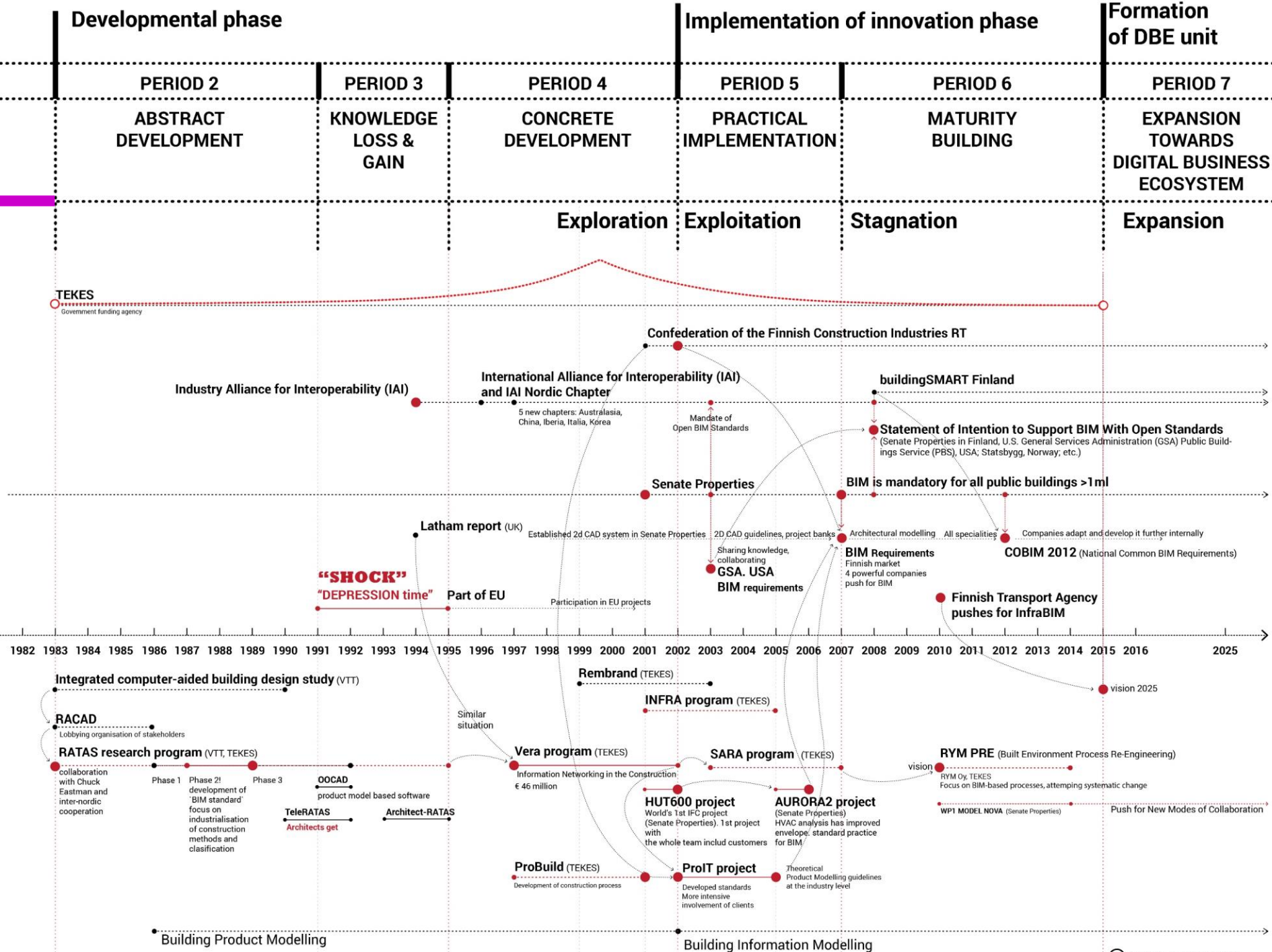
- BuildingSMART (at that time IAI, International Alliance for Interoperability) has just started and provided an excellent networking platform for Vera
- Internationally exceptionally good visibility for Finnish companies and research institutes, and Finland achieved global position as one of the leading countries in the BIM development and adoption.

New Software Products

- One of the key results of Vera was creation of basis for many innovative BIM software products, which have gained strong international position (Progman, Solibri).

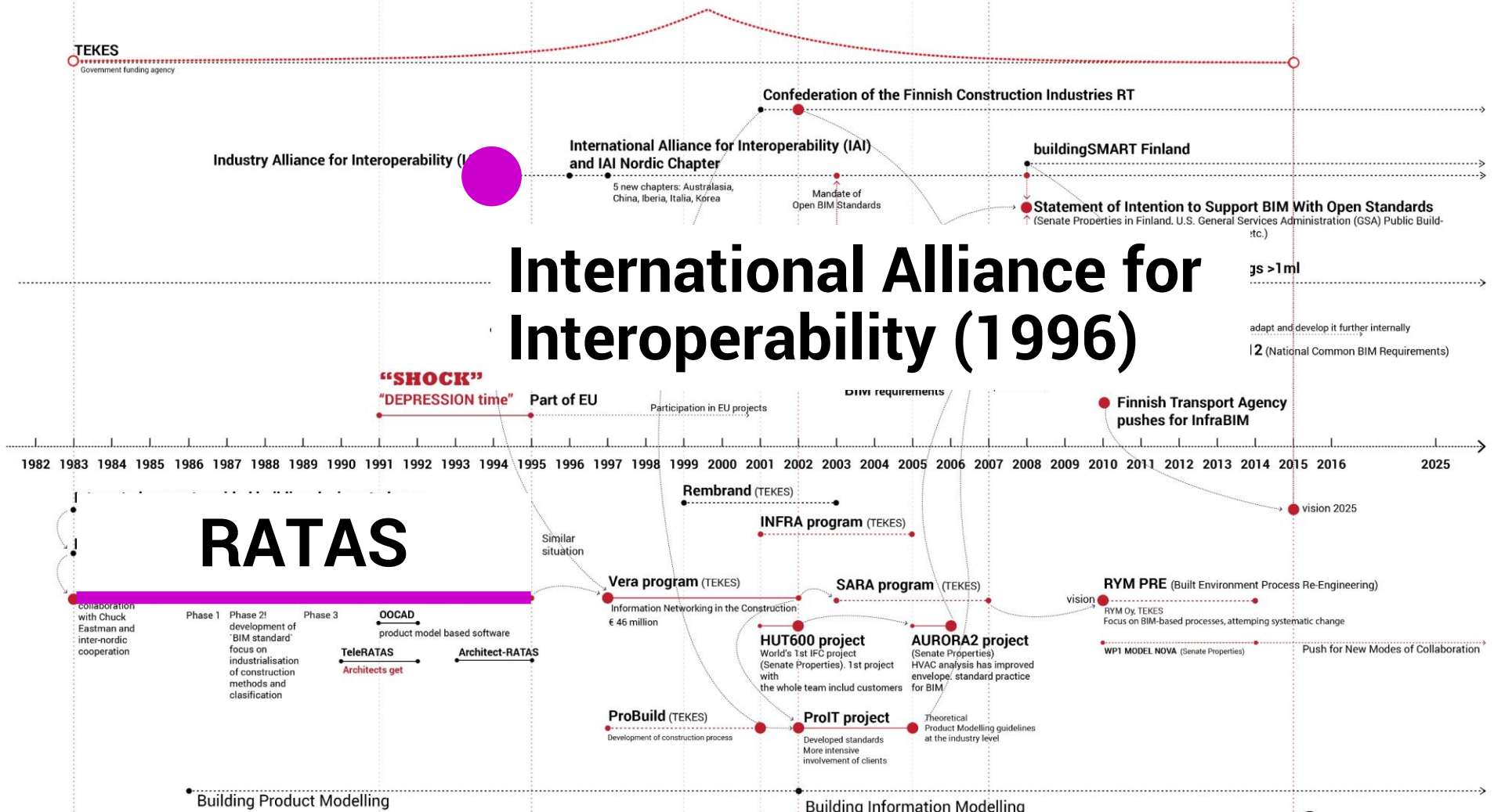
Innovation phase started with establishment of Tekla to challenge industry with technological solutions In 1965

Formation of innovation unit phase	Developmental phase			Implementation of innovation phase			Formation of DBE unit
PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	PERIOD 5	PERIOD 6	PERIOD 7	
EMERGENCE OF INNOVATION AND KNOWLEDGE HUB	ABSTRACT DEVELOPMENT	KNOWLEDGE LOSS & GAIN	CONCRETE DEVELOPMENT	PRACTICAL IMPLEMENTATION	MATURITY BUILDING	EXPANSION TOWARDS DIGITAL BUSINESS ECOSYSTEM	
			Exploration	Exploitation	Stagnation	Expansion	

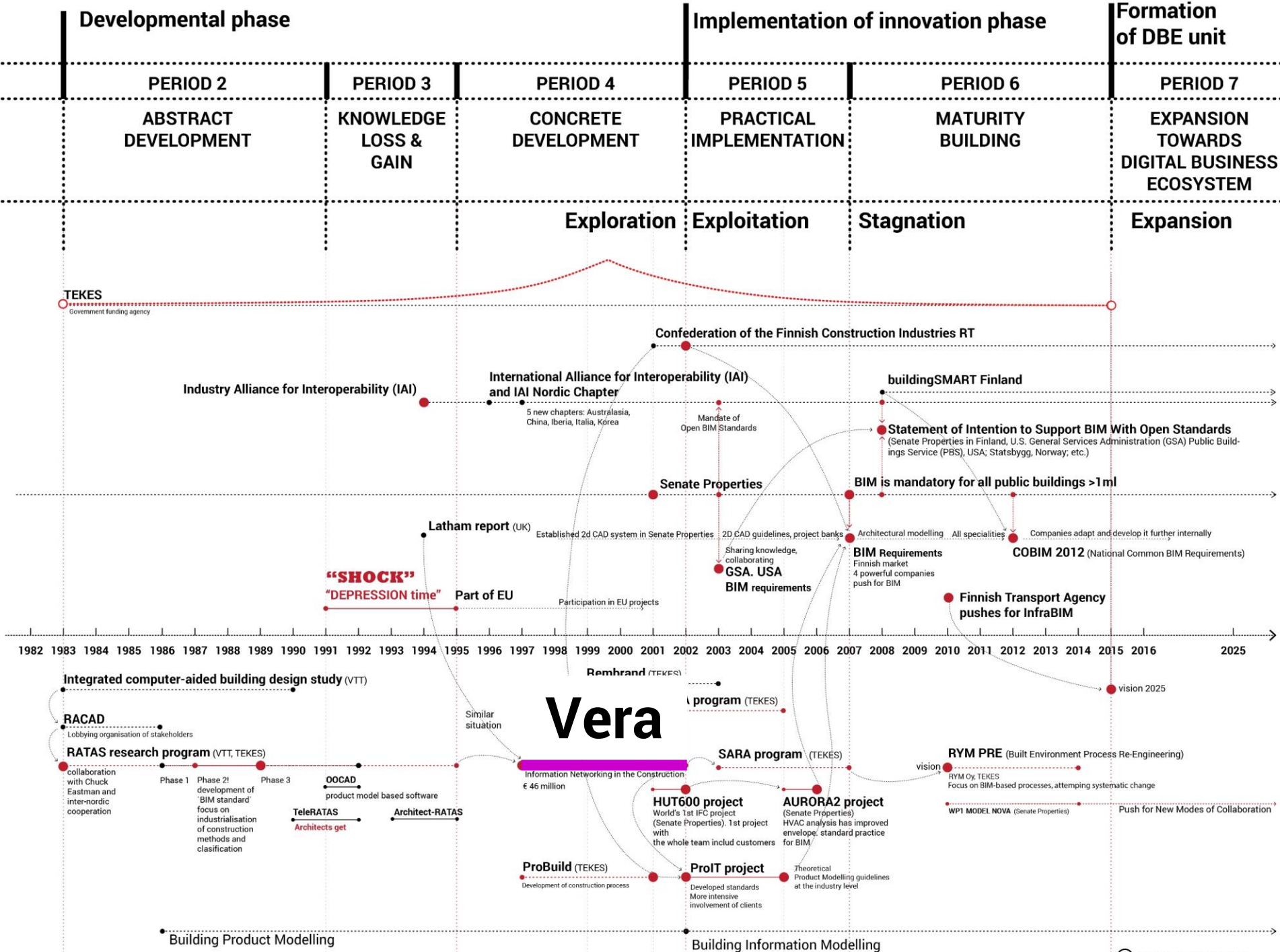


Formation of knowledge and innovation ecosystems

Formation of innovation unit phase	Developmental phase			Implementation of innovation phase			Formation of DBE unit
PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	PERIOD 5	PERIOD 6	PERIOD 7	
EMERGENCE OF INNOVATION AND KNOWLEDGE HUB	ABSTRACT DEVELOPMENT	KNOWLEDGE LOSS & GAIN	CONCRETE DEVELOPMENT	PRACTICAL IMPLEMENTATION	MATURITY BUILDING	EXPANSION TOWARDS DIGITAL BUSINESS ECOSYSTEM	
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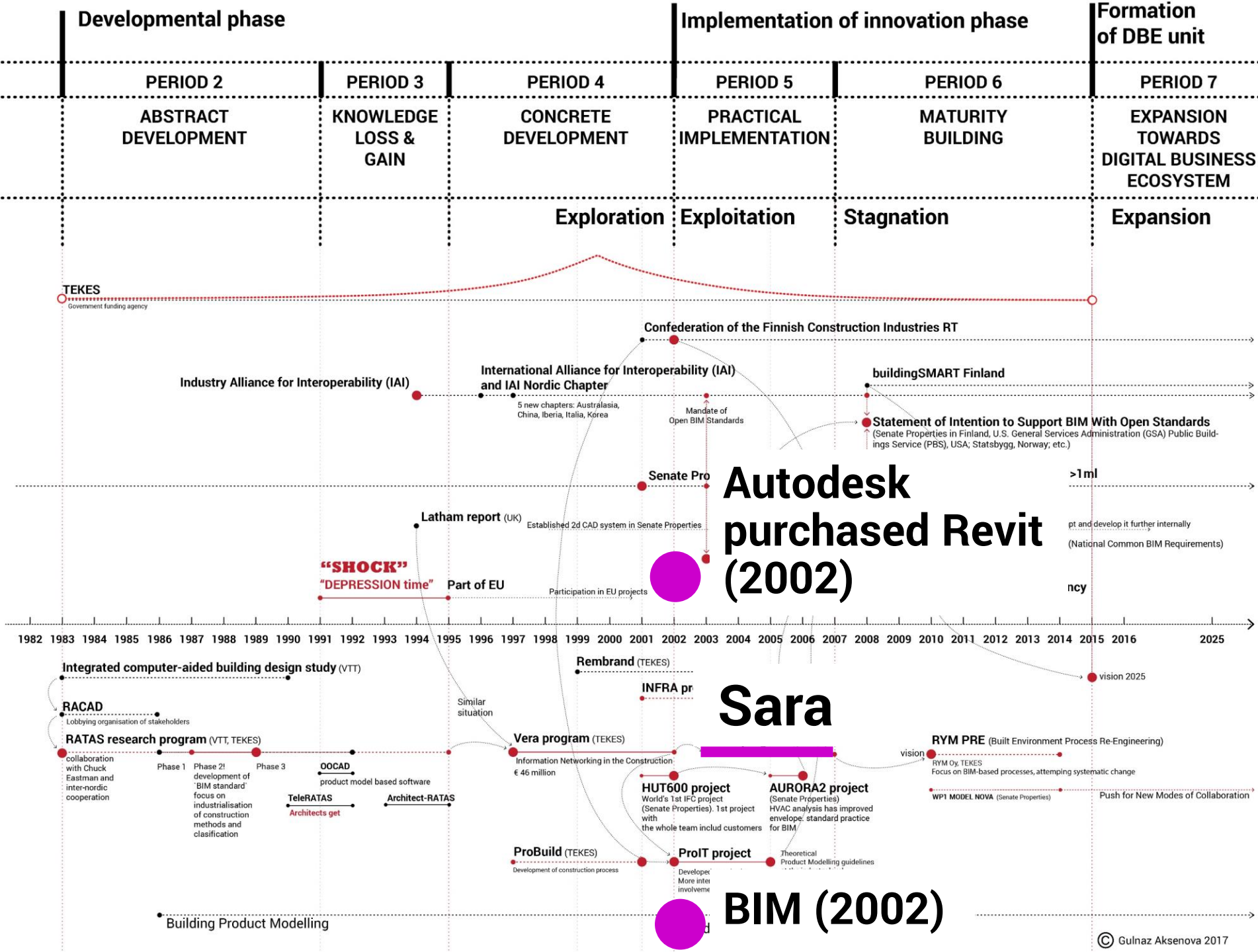


Intensive development of Industry specific technologies that were not available on the market



Formation of innovation unit phase	Developmental phase			Implementation of innovation phase			Formation of DBE unit
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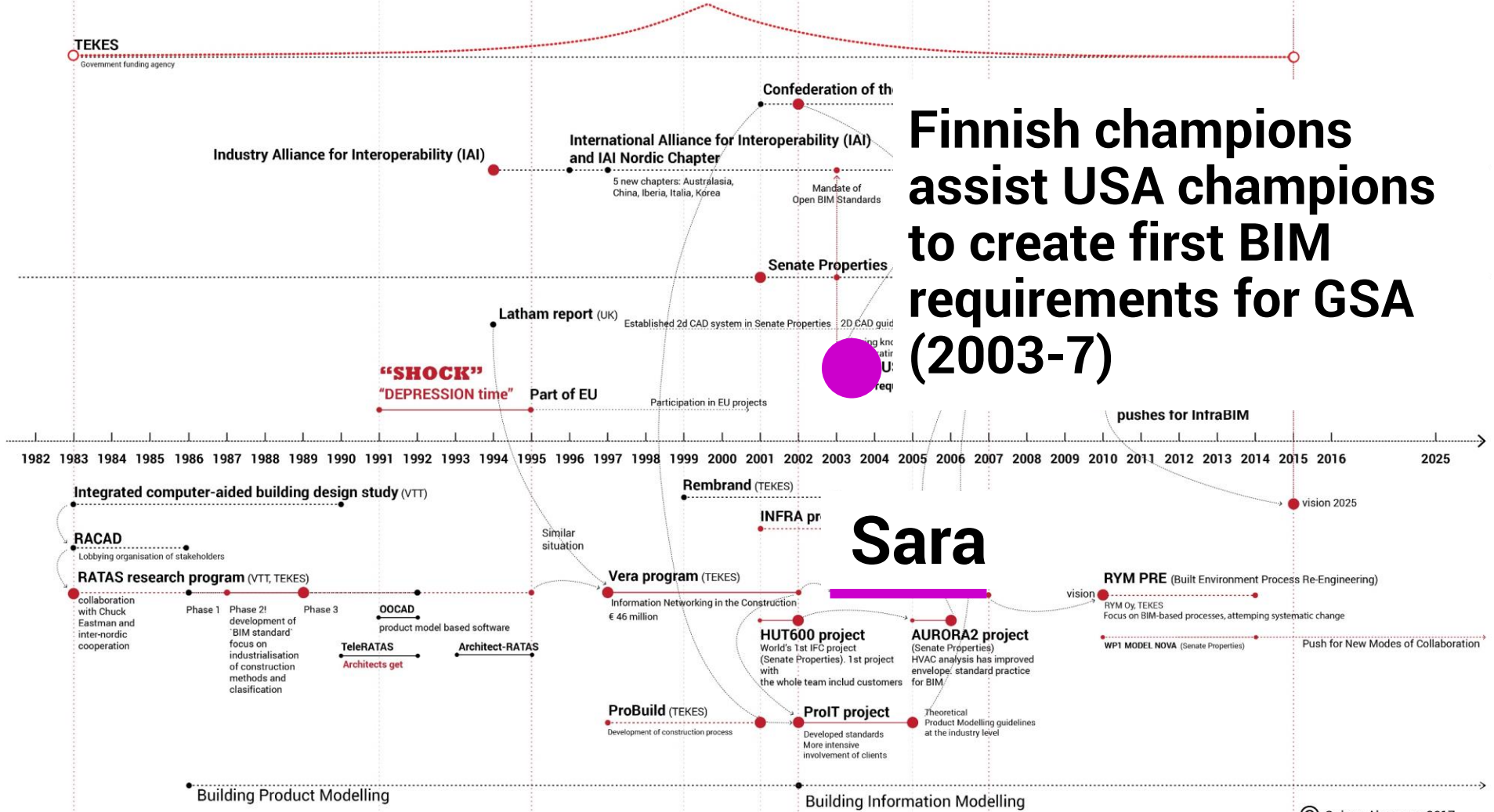
Maturity Building phase:
Sara aimed to create new business models in order to support new technological solutions has resulted in ineffective efforts



Formation of innovation unit phase	Developmental phase			Implementation of innovation phase			Formation of DBE unit
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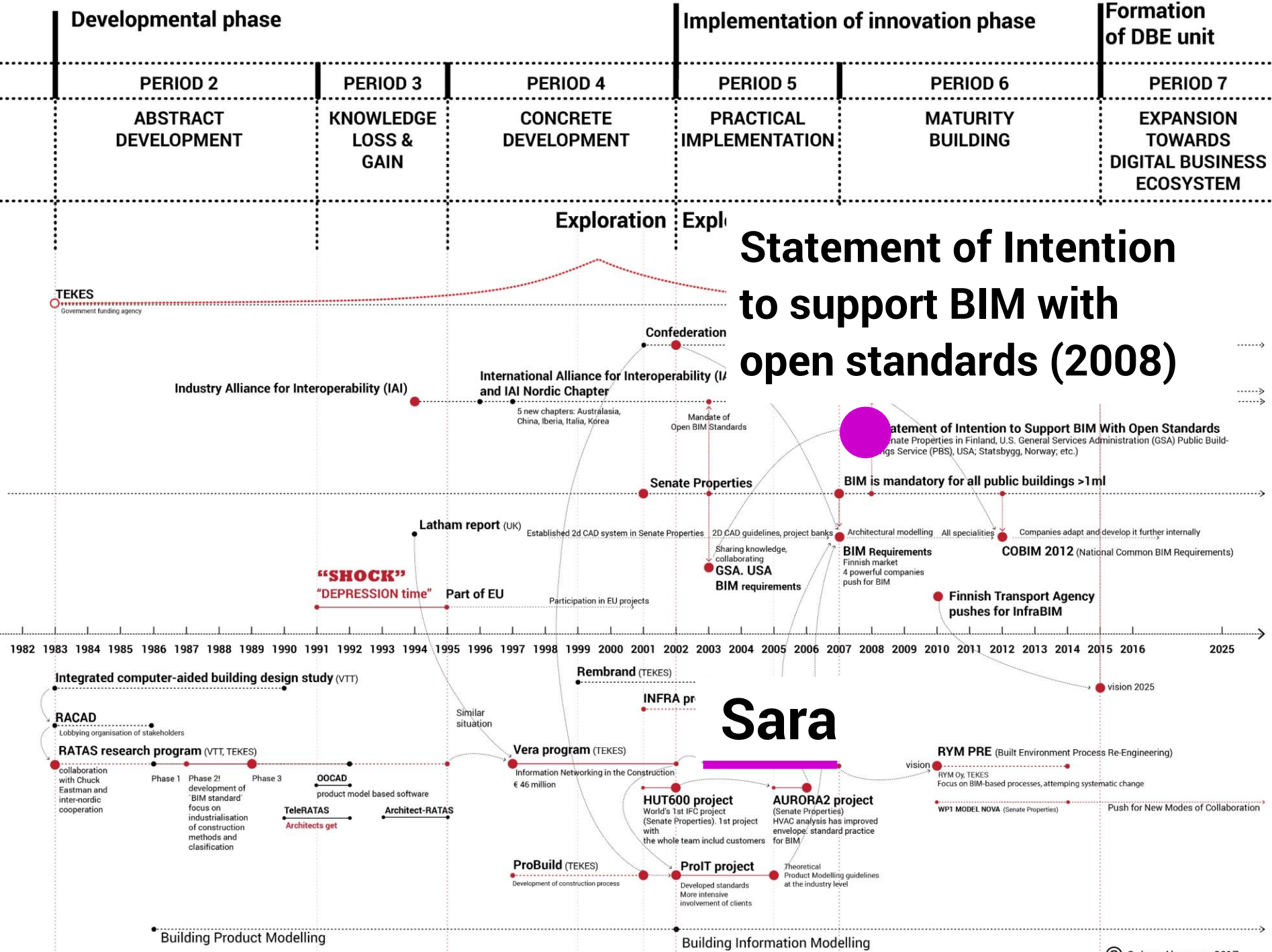
Finnish champions assist USA champions to create first BIM requirements for GSA (2003-7)



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Maturity Building phase:
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Statement of Intention to support BIM with open standards (2008)



Sara

Formation of innovation unit phase	Developmental phase			Implementation of innovation phase			Formation of DBE unit
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Stagnation (2007-15):
Incremental small improvements of productivity of various processes in the AEC sector.

