

How Finland developed Lean Construction and made IPD a part of project culture

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Background

Why is the construction sector performing poorly?

- Lack of integration, learning and exchange of experiences among actors in planning process
- Lack of continuous improvement
- Client's tendency to rather produce on the lowest price than the best value
- Lack of trust and respect between project actors
- Lack of incentives to increase innovation

Reasons for integration

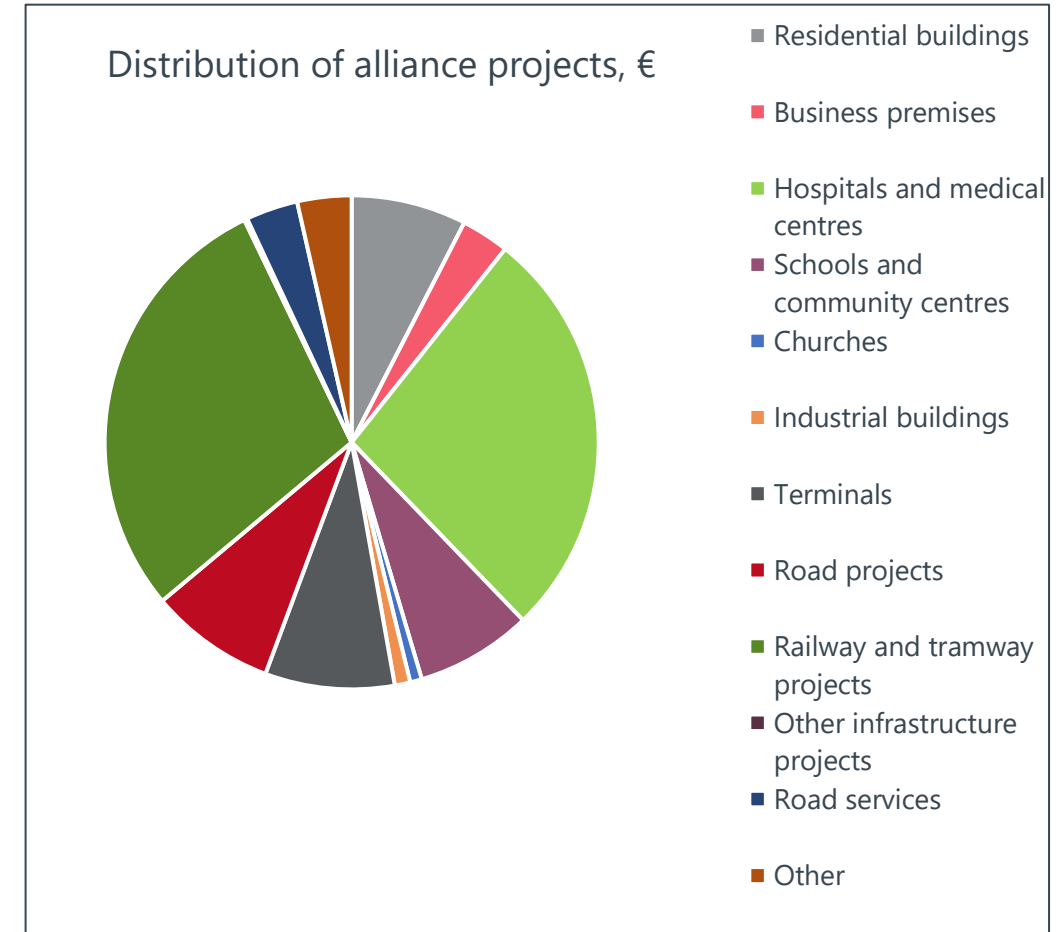
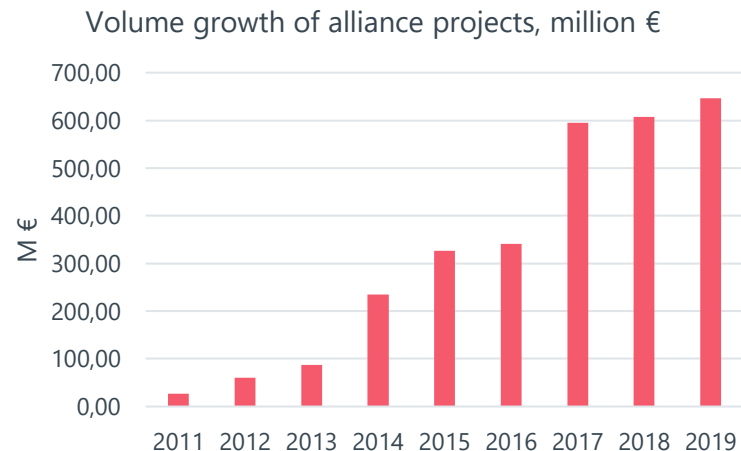
- Projects will become more and more complex
- Complexity leads to constant change
- Changes will result in changing contracts and additional costs
- Changes in contracts lead to contractual disputes?
- Risk transfer costs
- Different parties carry out their own assignments
- Some win and some lose
- Etc.



Current state of IPD

Current state of IPD models in Finland

- Nearly 100 projects have been launched with IPD models
- Total value around 5,5-6 billion euros
- By the cost, hospitals and healthcare centres (1,3 billion euros) and tramway projects (1,4 billion euros) take the largest share of alliance projects



IPD models are suitable for various projects

- Smaller projects
 - Several projects less than 10 M€ have been completed with IPD models
- Projects from other fields of businesses
 - Two IT system and service projects, The Finnish Transport Infrastructure Agency
 - Tesoma social and healthcare service alliance, City of Tampere & Mehiläinen Oy

**Alliance report
– Making Finland
the world leader in
integrated construction**



The report can be ordered:

vison@vison.fi

Case projects

First pilot projects

- Liekki-project (Railway renovation), Finnish Transportation Agency
- Tampere Tunnel, City of Tampere & Finnish Transportation Agency
- Vuolukiventie Campus renovation, University of Helsinki

Liekki – Railway Renovation

Project

- Lielähti-Kokemäki 90 km railway renovation project
- Project budget 106,4 M€
- Alliance partners: Finnish Transport Agency (owner) and VR Track (service provider)

Idea

- First public sector alliance project in Europe
- First fully open book –railway project in Finland
- Finding cost and time-efficient solutions while achieving other objectives at the same time

Outcome

- Completed 2/2015, about 3 months ahead of schedule
- Actual outturn costs 10 M€ under target
- Punctuality of railway traffic: 99,7 % (target 90 %)



Vuolukiventie Campus Renovation

Project

- Renovation (14.770 m²) and new construction (1000 m²)
- Target outturn cost 18,3 M€
- Alliance partners: Helsinki University (owner), SRV Ltd (general contractor) and SARC Architects Ltd
- Development phase 1-5/2012, implementation phase 6/2012-12/2013 + 5-year warranty phase

Idea

- First completed alliance project in Finland
- Life-cycle and energy efficient solutions
- 5-year warranty phase linked to the compensation model
- Maximum bonus 300.000 €

Outcome

- Innovations in space solutions > 27 new apartments
- 0-defect completion
- Exceeded environment and life-cycle objectives



Tampere Tunnel

Project

- 2 x one-way 2,3 km road tunnel
- Target cost 180,3 M€
- Development phase 6/2012 – 9/2013,
Implementation period 10/2013 – 11/2016

Idea

- Forming alliance with two Owners – City of Tampere and Finnish Transport Agency
- Improving Big Room activity and practices

Outcome

- Designing the project to Owner's target from 220 M€ to 180 M€
- Successful Big Room and TVD-process
- Major innovations
- Opened 6 months ahead and completed under the target outturn cost
- All KPI's exceeded



Helsinki Airport Terminal

Project

- 300 M€ Terminal Investment
- Renovation of 157.000 m² + 25.000 m² of new passenger and baggage facilities + 9 gates for widebody jets
- Alliance members: Finavia, ALA Architects, HKP Archtiects, Ramboll Finland and SRV (Construction)

Idea

- The best Project Alliance in Finland & Lean everywhere
- 50 % increase in passenger and baggage handling capacity



R&D projects

History of Project Integration in Finland

2006-2008

- **Studies of Australian Project Alliance**
- **Some understanding of Lean principles and IPD's**
- **Establishing Lean Construction Institute (LCI Finland)**

2009

- **Introducing Project Alliance**
- **EU-legislation challenge public procurement**

2010

- **1st Joint LCI R&D Project 2010-2012 (3 M€)**

2011

- **2 Project Alliances**
- **PATINA research and development project, Technical Research Centre of Finland**

2012

- **4 Project Alliances**

2013

- **6 Project Alliances + some hybrids**
- **2nd Joint LCI R&D Project 2013-15 (4,5 M€)**

2016

- **16 Project Alliances + 4 IPD Projects**
- **1st Public Sector R&D Project 2014-16 (11 pilot Projects)**

2015

- **34 Project Alliances + IPD Projects**

2016

- **Over 40 Project Alliances + several IPD Projects**
- **1st private sector R&D project RAIN 2016-18**

2017

- **Over 60 Project Alliances and IPD projects**
- **2nd Public Sector R&D Project 2017-19 (9 pilot Projects)**

2018

- **Almost 70 Project Alliances and IPD projects**
- **First Lean Construction Congress in Finland**

2019

- **Almost 80 Project Alliances and IPD projects**
- **2nd private sector R&D project RAIN2 2019-22**

2020

- **3rd Public Sector R&D Project 2020-22**
- **Publication of new Alliance Contracts and Guidelines**

TUKEFIN projects (2008-09 & 2010-11)

- Group project: public owners, contractors, consulting engineering companies
- Objective of the project was to improve productivity by
 - Adding to the innovativeness of procurement and cooperation
 - Eliminating waste from project deliveries
 - Accelerating lead times of tasks and projects

The IPD-projects 2014 -

2014-16 Project level



Foundation

- 11 Public organizations
- 11 Pilot Projects
- IPD Procurement
- IPD Agreements and commercial models
- IPD phases
- Lean principles and some tools

2017-19 Organization level



Producing value and improving productivity

- 13 Public Organization
- 13 Pilot Projects
- Building new culture
- Challenging and educating people
- Lean processes and tools
- Creating value and reducing waste

Industry level



#1 in Using Integrated Project

- New strategies
- New business models and opportunities
- Focus to operational and lifecycle value
- Something we have not seen yet

IPD-project (2014-16)

- The goal for the first IPD project was to establish a strong base understanding in client organisations for further projects and development of the model
- The interplay between actors was further strengthened in pilot projects which integrated the IPD models
- The project consisted of 10 seminars, the purpose of which was to introduce the project to the participants and enable the client organisations to familiarize themselves with the IPD model



IPD: pilot projects and organizations

Pilot	M€
Central Jakomäki redevelopment, City of Helsinki	30
Kainuu central hospital reconstruction, Kainuu Social Welfare and Health Care Joint Authority	135
Project alliance of railway maintenance KP2, Finnish Transport Infrastructure Agency	25
Leppävaara school and daycare centre, City of Espoo	30-35
Pohjankartano school renovation, City of Oulu	10
Children's and Women's Hospital, The Northern Ostrobothnia Hospital District	60-70
The alliance of Turku Syvälahti school, City of Turku	28
Tammela stadion, City of Tampere	60
Tesoma social and healthcare service alliance (10 years), City of Tampere	140
Overhaul of highway 6 Taavetti – Lappeenranta, Finnish Transport Infrastructure Agency	76
Yliopistonkatu 4 reconstruction, University of Helsinki	25
Total	> 600

Gasum



FINAVIA
for smooth travelling



Helsingin kaupunki



HELSINGIN YLIOPISTO



Kainuun sote

ppshp

POHJOIS-POHJANMAAN
SAIRAANHOITOPIIRI

OULU | Tilakeskus



TAMPERE

RAKLI
Tilaa elämälle

vison

Liikennevirasto

IPD: project results

- Development of IPD procurement methods and increase of knowledge in 11 organizations
- Training and coaching of around 120 specialists
- 11 pilot projects, with total value of over 600 million euros



IPD²-project (2017-19)

- The focus of the second IPD project was on successfully integrating the procedures learned to ensure high productivity and quality in production
- By providing an alternative for the current market model, the project aimed to improve production and value generation during the development and implementation phases
- The project consisted of around 20 advanced workshops and seminars, with the goal of further deepening the existing knowledge and acting as a supporting system for the established pilot projects



IPD²: pilot projects and organizations

Pilot	M€
Hospital's New Heart 2025 project, Kuopio University Hospital	165
Hämeenkylä and Rajatorppa schools, City of Vantaa	30
BothniaHigh5 –alliance, Vaasa Central Hospital	145
Ahvenisto Central Hospital -alliance, Kanta-Häme	370
University of Helsinki main building reconstruction	40
Park Hospital, HUS	80
Project alliance of railway maintenance KP1, Finnish Transport Infrastructure Agency	100
Pakilanpuisto alliance, City of Helsinki	50
Turku street network mainenance, City of Turku	30
	> 1000



IPD²: project results

- Development of IPD procurement methods and increase of knowledge in 13 organizations
- Training and coaching of around 150 specialists
- 9 pilot projects, with total value of over 1 billion euros
- Parties expanded their knowledge and shared it with various operators and subcontractors



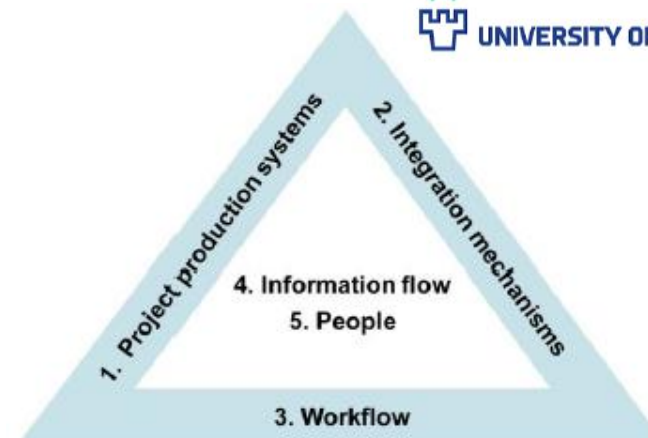
IPD³-project (2020-22)

- Projects from various industries: new constructions, reconstructions, infrastructure projects, service alliances
- Developing and deepening the knowledge of the participants
 - Target value design / target value delivery
 - Increase of productivity
 - Dynamics management
 - Information flow
 - Reforming the strategies and business models
- Changing project culture towards value delivery
- The introductory seminar was held in 13.2.2020 in Helsinki



RAIN1-project (2016-18)

- RAIN1 was a joint R&D program with a budget of 500 000€ which aim was to promote cooperation within the field
- For private companies and universities and coordinated by Vison
- The project consisted of around 20 seminars and workshops
- Five main themes
 1. Project production systems
 2. Integration mechanisms
 3. Workflow
 4. Information flow
 5. People



RAIN1: organisations and results

- 11 private companies participated in the project, as well as 2 universities
- Integrated project deliveries normalized as part of construction projects
- Clarified working models ready for use in demanding projects



RAIN2-project (2019-22)

Principal idea

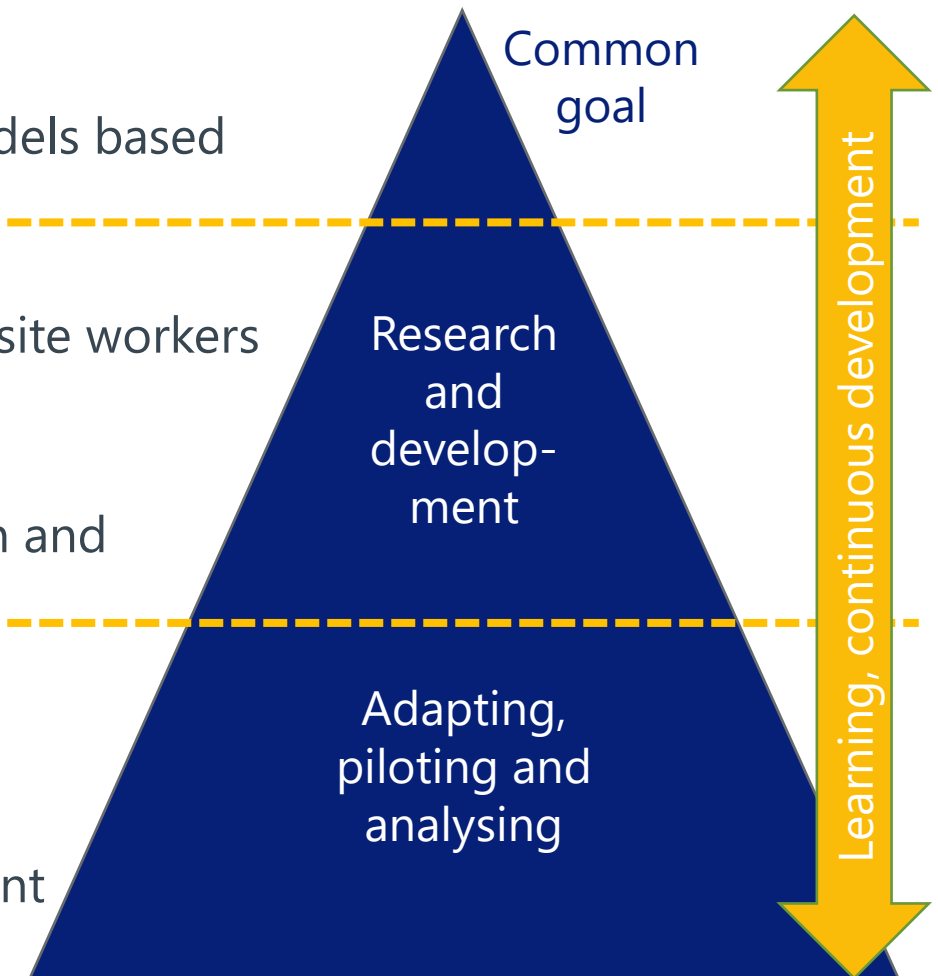
- Implementing and continuously developing operating models based on lean to support integration

Main themes

1. Extending and deepening integration from planning to site workers and supply chain
2. Lean management and tools for cooperation
3. Adopting flow model in different phases of construction and removing its barriers.

Implementation

- Theory, research, examples and experiences
- Adaption in company pilots and common pilots
- Information gathering, analyzing, learning and improvement
- RAIN2-offers framework and sharing platform



RAIN2: working methods and organisations

- The project will consist of around 4 workshops per year and the establishing of several pilot projects
- 9 organisations have signed up for the project



Results



Results of survey conducted by Vison Oy in 2017

The survey had a total of 128 respondents from 13 different IPD projects

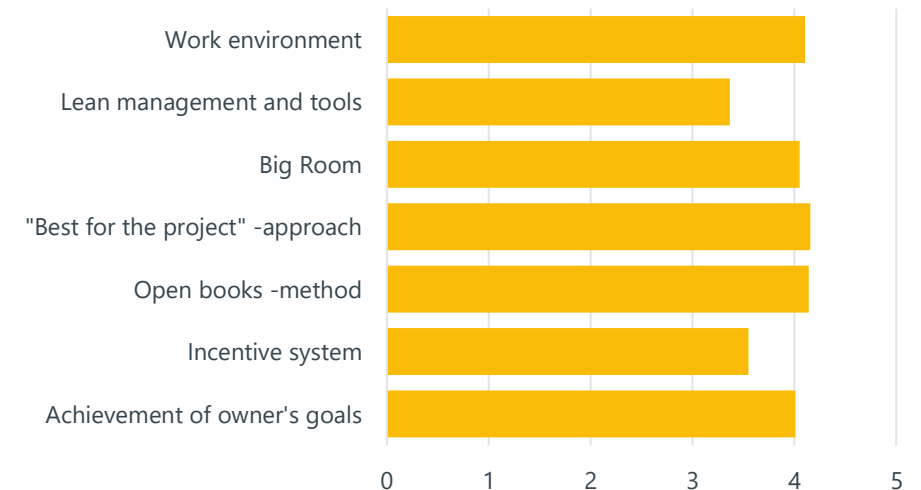
Upsides of IPD models:

- Cooperation between participants and workshop-based working
- More open discussion and listening
- Communication is smoother in common project offices → faster problem solving

Main challenges of IPD models:

- Owner's limited resources
- Management of the development phase
- Determination and strictness of the target cost

How successfully have the following principles / tools actualized in the project?
(5 = very successful)



Integration has led to:

- Better results (owner's goals, budget, schedule etc)
- Better tools for managing change
- Better focus on value
- Better exploit of key parties' know-how
- Better leadership, focusing on people and challenging and educating professionals
- Adaption of Lean Construction in the Industry



Finland's experience

- So far, the completed IPD projects have achieved the targeted schedule and budget goals
- Implementation of the IPD models has triggered a change across the whole construction field
 - The fundamental principles of IPD models are quickly spreading across traditional construction models
 - Cooperation, incentive system, Big Room etc.
- However, not all the projects have successfully been completed with IPD models
 - Two projects have been suspended at the end of the development phase

Future steps

The next steps?

- New types of IPD projects
 - Infrastructure management and maintenance services
 - Real Estate Services
 - Social and health care services
 - ICT projects
- More comprehensive use of Lean production → increase in productivity and quality
 - Takt time production
 - Last Planner
 - Target Value Design



Takt time production is hot

- The aim of takt time production is to improve the conditions for productive work and reduce unnecessary waiting time (waste)
- Takt time production focuses on
 - Proper pre-planning of work
 - Daily communication
- Biggest challenges of takt time production are
 - Diversity of subcontracting models and contracts
 - Ingrained attitudes and traditional operating models of the industry



After all...

Nothing
teaches us better than our own
experiences!