Addressing Procurement Barriers to Innovative Wood Buildings

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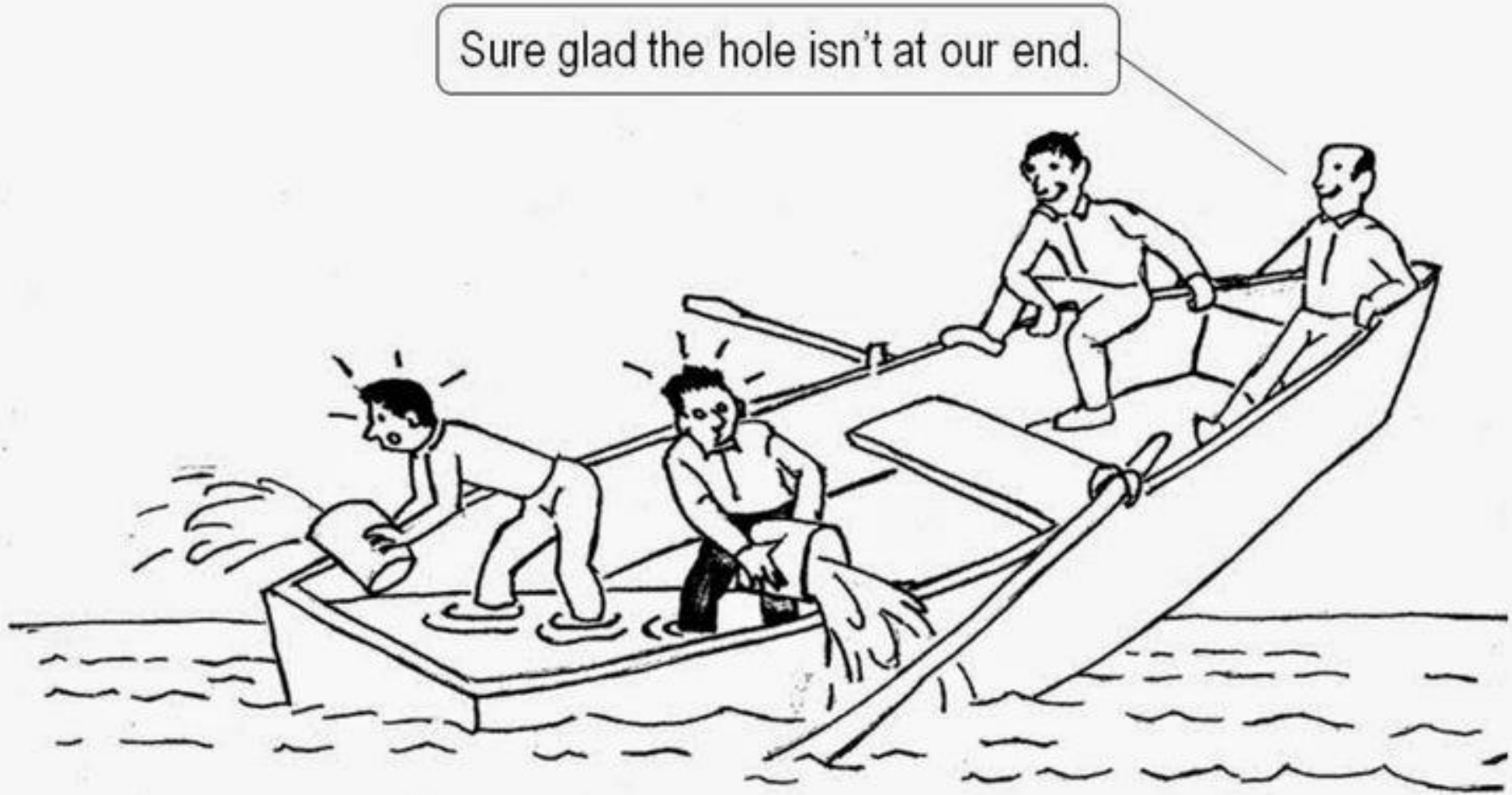
CCBST 2017

Construction has failed to modernize


Sure glad the hole isn't at our end.

Persistent challenges

- **Inertia to change** resulting from the familiarity with established contractual structures
- **Fractious and adversarial relationships**
- Perception that innovation is **likely to cost more** and time consuming
- Reluctance to engage in a process which may lead to **loss of control**
- **Misaligned risk / reward structure**
- **Short term thinking / first cost driven**
- **Lack of adequate education and training**
- Existing **insurance and bonding models** do not comfortably accommodate collaboration

About the study

- Overview of models, processes and practices drawn from local and international actions
- Highlight the role of procurement in driving innovation in construction
- Applicability to BC (and elsewhere)
- Applicability to wood projects (and others)
- Aimed at public and private owners, consultants and contractors

British Columbia Construction Association

Forestry Innovation Investment®

Project team

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With support from

British Columbia Construction Association

BCCA and VRCA staff
BCCA Construction Innovation committee

GET INNOVATION FRIENDLY

READ THE FREE REPORT

Why mass timber?

- Timber technologies represent the leading edge of innovation in construction today
- “Proxy” for broader application

Research methodology

- **Literature review** of best practices in BC and elsewhere
- **Assessment** of common procurement methods for their ability to achieve the best environment for innovation and best value for key stakeholders.
- **In-depth review** of traditional and innovative procurement approaches.
- **Interviews** with 10 industry experts

Workshop with 32 industry professionals

Hands-on industry engagement with innovative project procurement

GROUP 1: PBC, SFU, City of Coquitlam, Translink

Student residence, library and station upgrade

- **Location:** Lower Mainland

GROUP 2: UBC

Urban agriculture building and indoor farm

- **Location:** Vancouver

GROUP 3: City of Vancouver

Zero emissions fire hall, community room and social housing

- **Location:** False Creek Flats, Vancouver

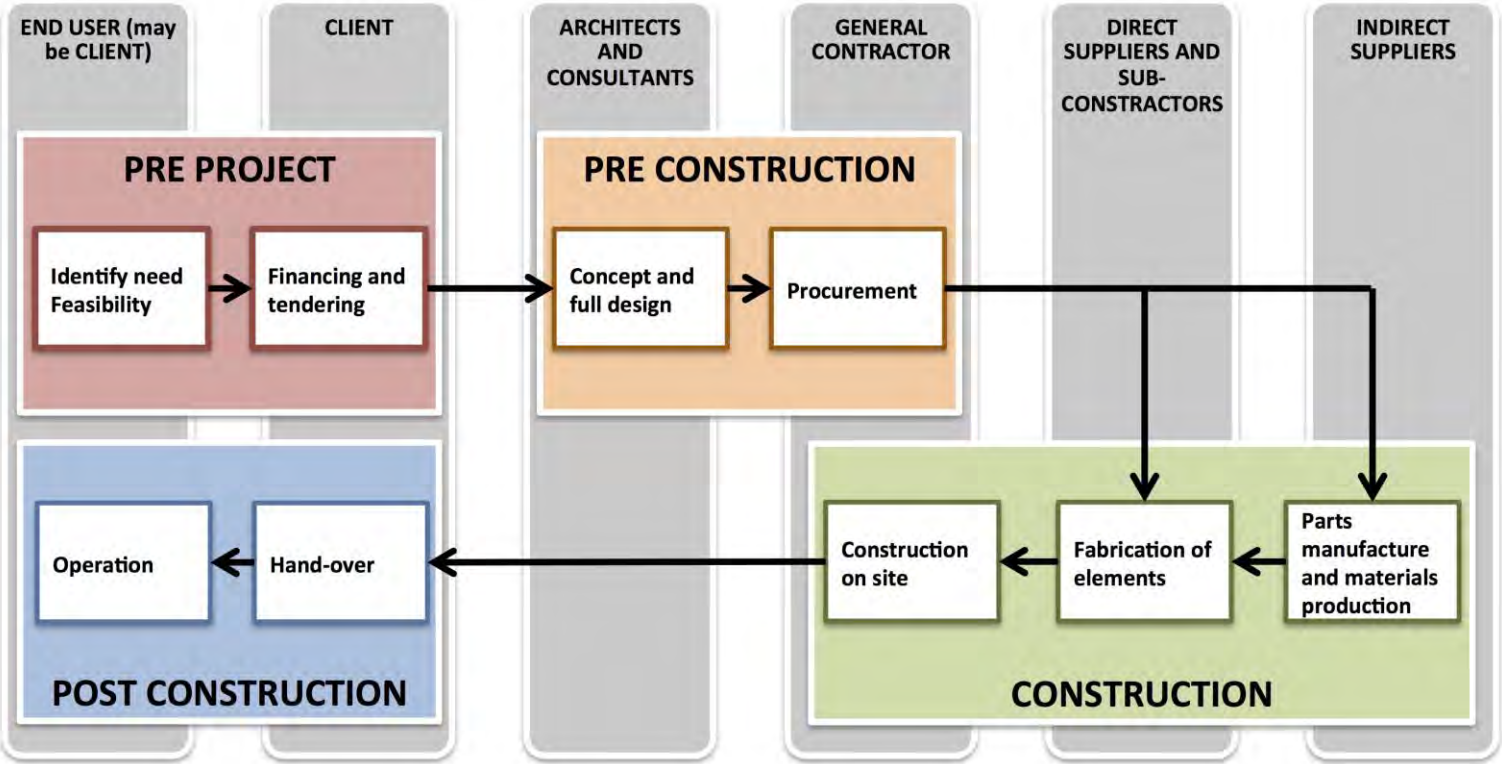
GROUP 4: BC Housing

30 unit seniors resident, cafe and school room

- **Location:** ocean front site, remote community

Defining "procurement"

- Includes sourcing, purchasing, and all activities related to providing knowledge, manpower, construction equipment, materials, supplies, supervision, and management services necessary to accomplish the project objectives.
- May include ongoing management of the asset, to the extent that building operation and maintenance procedures are affected by the original work.



The project delivery process involves many players

Application of innovation in construction is challenging

- Every project is unique
- Formatting the procurement process to enable construction companies to **manage, measure and control** the development and application of new ideas systematically is an important first step towards the standardization of innovation.

Benefits of standardized innovation management

A construction company could see significant improvements in the following areas:

- Organization of activities
- Competitiveness in the medium and long- term
- Integration of corporate management processes within the company's overall strategy
- Efficient exploitation of the organization’s knowledge
- Systematization of new process and product knowledge

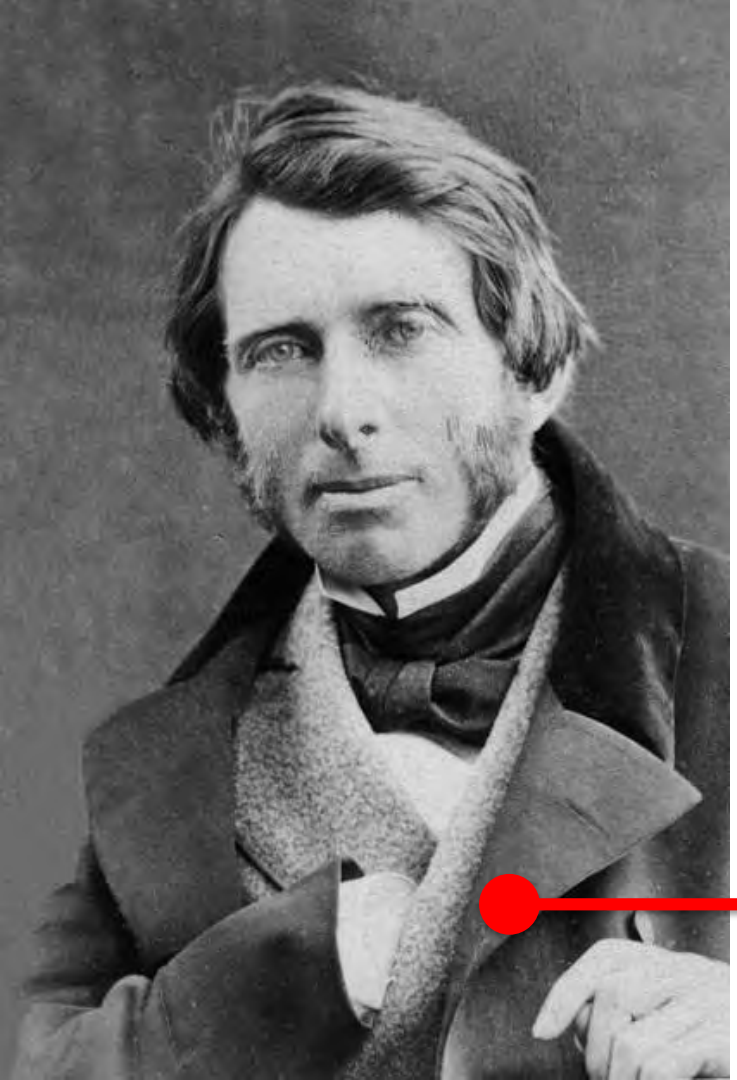
Special considerations when working with innovative wood technologies

- **Wood is not a homogenous material**
- **Contract documents need to make special provision** for weather and moisture protection, constructability (e.g. lifting, storage, etc.) and fire protection during construction.
- **Testing is required** to ascertain the performance of a material, product or assembly for many characteristics, such as structural, moisture resistance, fire, durability and toxicity.
- **Research and testing takes time and can be expensive** so it needs to be identified early and factored into the design and construction process and budget.

The role of the Owner

Creating a procurement process that is conducive to innovation starts with an owner who can:

- Identify a project with the potential to incorporate innovative solutions
- Clearly, accurately and completely describe the project requirements
- Establish a fair, open and transparent project team selection process by which to evaluate responses
- Select a delivery model that, for the entire duration of the project, fosters full team collaboration, manages risk appropriately and ensures accountability of all parties (i.e. puts the best interests of the project first)



“It is unwise to pay too much, but it is worse to pay too little.”

“When you pay too much you lose a little money. When you pay too little, you sometimes lose everything, because the thing you bought was incapable of doing the thing it was bought to do.

The common law of business balance prohibits paying a little and getting a lot - it can’t be done.

If you deal with the lowest bidder, it’s well to add something for the risk you run, and if you do that, you will have enough to pay for something better.”

John Ruskin (1819 - 1900), English art critic and social thinker

DEFINING VALUE

$1 extra spent on design = $20 savings in construction
and $60 savings in operation

Capital Cost v Life Cycle Cost

Royal Academy of Engineers 1:5:200 "rule of thumb"

IF

The initial construction cost of a building is

1

THEN

Its O&M costs over the years are

5

AND

Business operating costs in that building are

200

- Initial capital cost may only account for around **20%** of the total costs that the building owner will incur during the period of ownership – particularly when energy bills and maintenance costs are taken into account.
- If the costs of staff using buildings are included then this is reduced to just **0.5%.**

Measurable performance targets

Category	Example of performance target
Schedule	Construction completion date
Cost	
• Capital cost	Achieve budget cost
• Life cycle cost	Achieve budget cost (measured after start-up period)
Quality	Owner satisfaction (measured by survey of end users) Defects & call-backs
Environmental performance	Energy = Steady indoor temperature of (e.g. 20- 22°C) GHG emissions in $kgC0_2/m^2$ Acoustics = STC ratings Waste in tonnes of waste generated (total or per m^2) Indoor Air Quality = presence of mould spores, VOCs (ppm)
Safety	Accident rate

Tools for creating an integrated, collaborative team

- Early market engagement
- Sanctioned design competitions
- Competitive dialogue
- Performance incentives

Early market engagement

EME can cover a wide range of issues

Feasibility: whether what is sought is possible, or has ever been done.

Capability: the ability of the market to achieve what is required.

Maturity: whether there is an established market for the requirement and whether there are enough suppliers in existence for competitive procurement.

Capacity: whether the market can achieve what is required quickly enough, or on a large enough scale.

Cost: whether the desired material or technology can be procured and incorporated into the client's project at reasonable cost.

Performance incentives

- Performance penalties tend to foster defensive, risk-averse behaviour.
- Incentives help to protect against the team entrenching into silos at the first sign of a challenge.
- Profit pools and integrated project delivery (IPD) put everyone on the same side.

Incorporating innovation into bids and tenders

- **A clearly defined scoring system** that allocates points and weighting for specific project outcomes is recommended where performance-based outcomes are required
- **A definition of what innovation means** to the owner (and the project) and how it will be evaluated.

Balancing risk without stifling innovation

- Key lies in the Owner's approach to project definition and the team culture.
- A greater focus on how the ultimate end-user will work in the building once it is complete leads to more 'output-based' definitions.
- Requires a major culture shift from the traditional 'silo' mentality, where who does what was precisely defined.

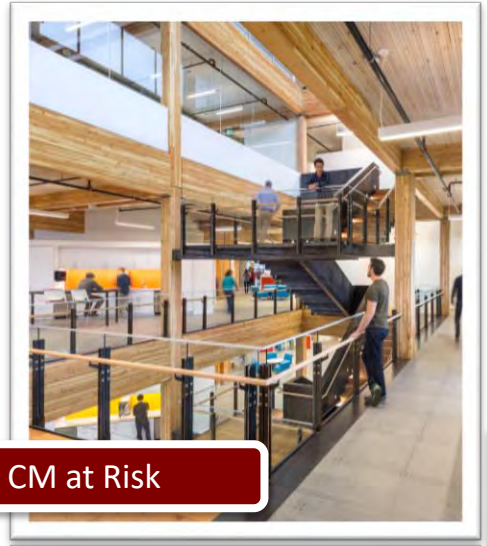
Considerations when defining “Quality”

- Available funding and time
- Existing corporate policies (such as environmental policies)
- Key requirements of the business
- Key requirements of stakeholders
- The views of external organizations such as the local governments and community groups

FAIR
OPEN
TRANSPARENT

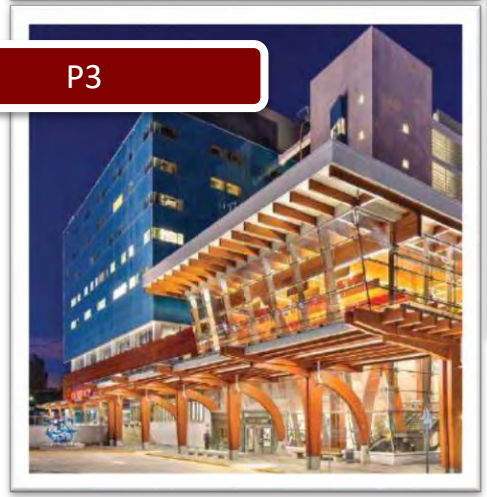
Summary of models in the context of innovation

	Design-Bid-Build	CM	Design-Build	P3	IPD
Time predictability	✓			✓	✓
Cost certainty	✓		✓	✓	✓
Requires an experienced owner		✓		✓	
Requires an experienced construction company		✓		✓	✓
Suitable for a market experiencing rapid price escalation	✓		✓	✓	
Suitable for small projects	✓		✓		
Suitable for complex projects	✓	✓		✓	✓
Suitable for fast track projects		✓	✓	✓	✓
Suitable for an uncertain or developing brief		✓			✓



CM at Risk

Design – Bid - Build



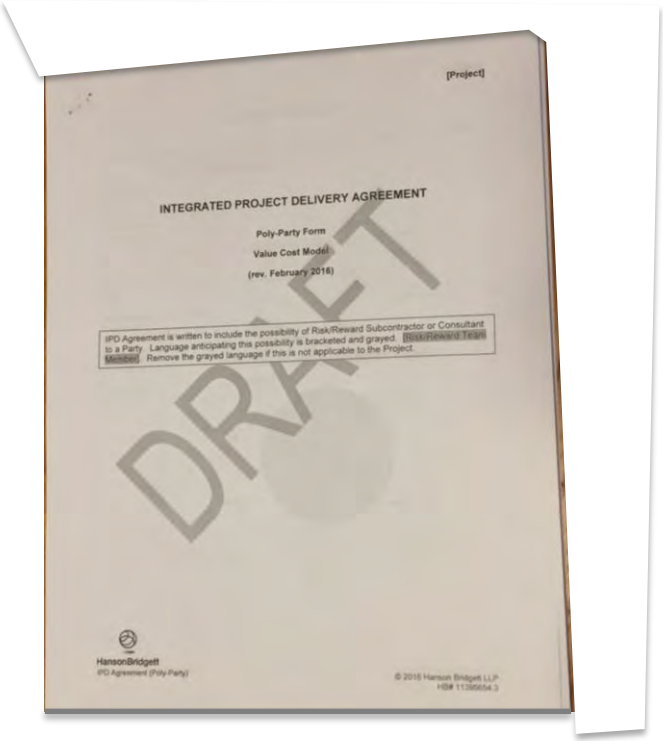
P3

Design - Build

IPD?

Delivery models

Integrated Project Delivery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INTEGRATED PROJECT DELIVERY AGREEMENT

Poly-Party Form

Value Cost Model

(rev. February 2016)

IPD Agreement is written to include the possibility of Risk/Reward Subcontractor or Consultant to a Party. Language anticipating this possibility is bracketed and grayed. [Risk/Reward Team Member]. Remove the grayed language if this is not applicable to the Project.

DRAFT

HansonBridgett

IPD Agreement (Poly-Party)

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HB# 11396654.3

CCDC Integrated Project Delivery Agreement (DRAFT)

JCT Constructing Excellence (2016)

JCT-CE: *"The Overriding Principle … is that of collaboration."*

- 2 standard documents: 1) contract and 2) project ream agreement
- Used to formalize the integration of the project team
- Includes options that provide for risk and reward sharing arrangements between team members.

All parties required to have the *"intention to work together with each other and with all other project participants in a co-operative and collaborative manner in good faith and in the spirit of mutual trust and respect"*.

Summary of best practices

- **Early involvement** of all key project team members
- **Clear measurable goals** and KPIs
- Apply all available tools to create an **effective collaborative project team**
- **Life cycle costing** is used to articulate the business case for innovation
- **Technical and logistical considerations of building with wood** are factored in.

- **High quality contract documents**
- **Project risks are understood**, managed and apportioned fairly.
- **Ample education** and training opportunities
- **"Feedback loops"** to foster a culture of learning
- **Intellectual property is respected** and protected.

Opportunities for further research

- **Standards for occupational health and safety** and for fire protection in wood projects
- **Consistency in how "Best Value" is defined** and evaluated during bid selection.
- **Develop LCC data** on new products and materials.
- **Develop open standards for prefabricated construction** in Canada, which allows wood structures, proprietary systems and other systems to compete on a level playing field.
- **Construction-specific education** to address technical issues of mass timber construction and pre-fabrication.
- **Tools to improve businesses resiliency** for SMEs.

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THANK YOU