



Modernising Silviculture – A Mondi Perspective

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Overview



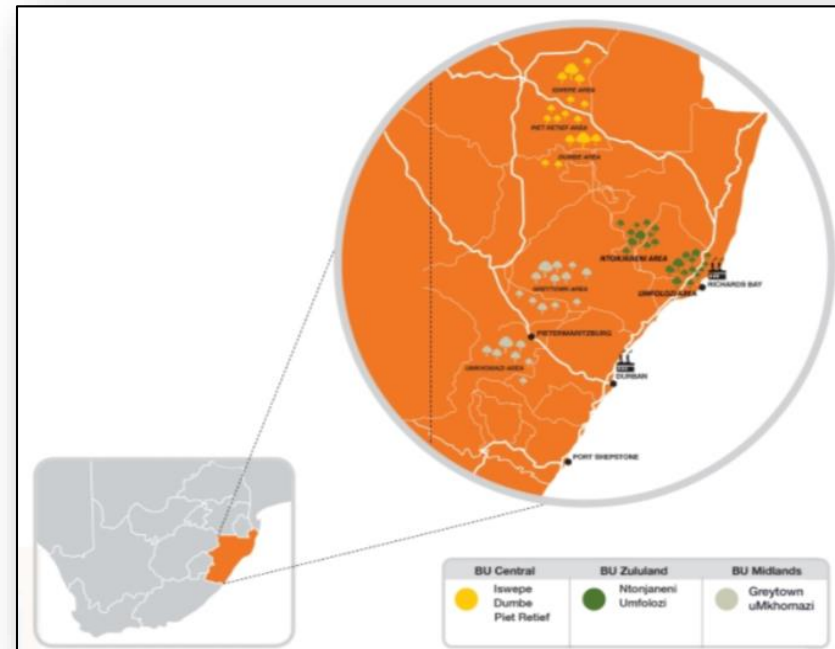
- Terminology
- Mondi Forests In Context
- Industry Challenges
- Key Drivers
- Safety And Ergonomics
- International Competitiveness
- Silviculture Focus Areas
- Modernising Fire Fighting
- Learnings

- Modernisation and mechanisation are **not synonymous**.
- Modernisation can be an ergonomic, safety or technical intervention ranging from a better hand tool to a fully mechanised operation.
- Mechanisation is the introduction of machinery to an operation as part of modernisation.

Mondi Forests In Context



- Practice intensive short-rotation plantation forestry.
- Invest heavily in planting, maintenance, crop protection and fire suppression operations.
- Benchmark well with international competitors as a low cost pulpwood producer.
- Not self-sufficient in pulpwood supply - Target 75% self-sufficiency and 90% secured supply.
- 100% FSC certified since 1997.
- 100% of operations outsourced since 2002 - Contractor and operational research model.
- Modernised operations since 2012. Focus on safety, ergonomic, productivity and costs.
- Complex socio-economic and political environment.
 - Land reform.
 - Rural unemployment and poverty.
 - Water licences.
- Abiotic and biotic stress factors a constant challenge.



Forest Industry Workforce Challenges



- Aging rural workforce & 5% annual decline in rural population.
- Increasing labour costs.
- High labour turnover (20 - 50%) and absenteeism (10 - 20%).
- Problematic health conditions, impact of HIV/Aids (HIV infection >30%).
- Productivity and quality challenges of manual operations.
- Poor ergonomic practice – Move from physically demanding to more cognitive.
- Safety challenges with chainsaws and sharp tools.



Key Drivers



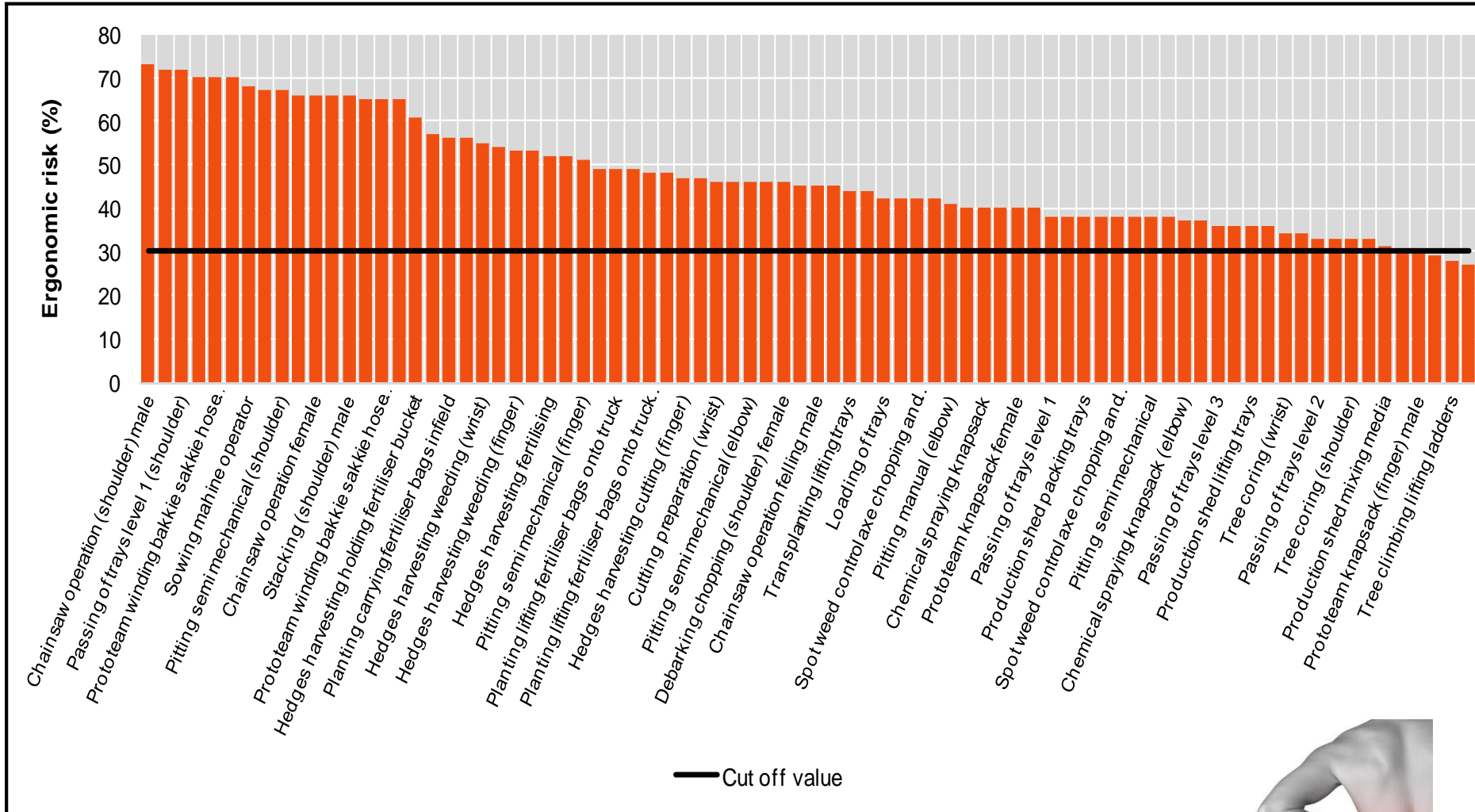
Introduction of modernisation to silviculture influenced by:

- Concept of decent work.
- Improving working conditions through ergonomic interventions.
- Eliminating safety risks, especially sharp tools.
- Reducing exposure to harsh climatic conditions.
- Reducing exposure to monotonous work.
- Striving for a more stable and educated work force.
- Improved productivity & quality optimization of silviculture operations.
- Remain internationally competitive - Constant innovation to survive as a low cost pulp producer.

Modernisation Safety Performance



Ergonomic Risk By Job Description

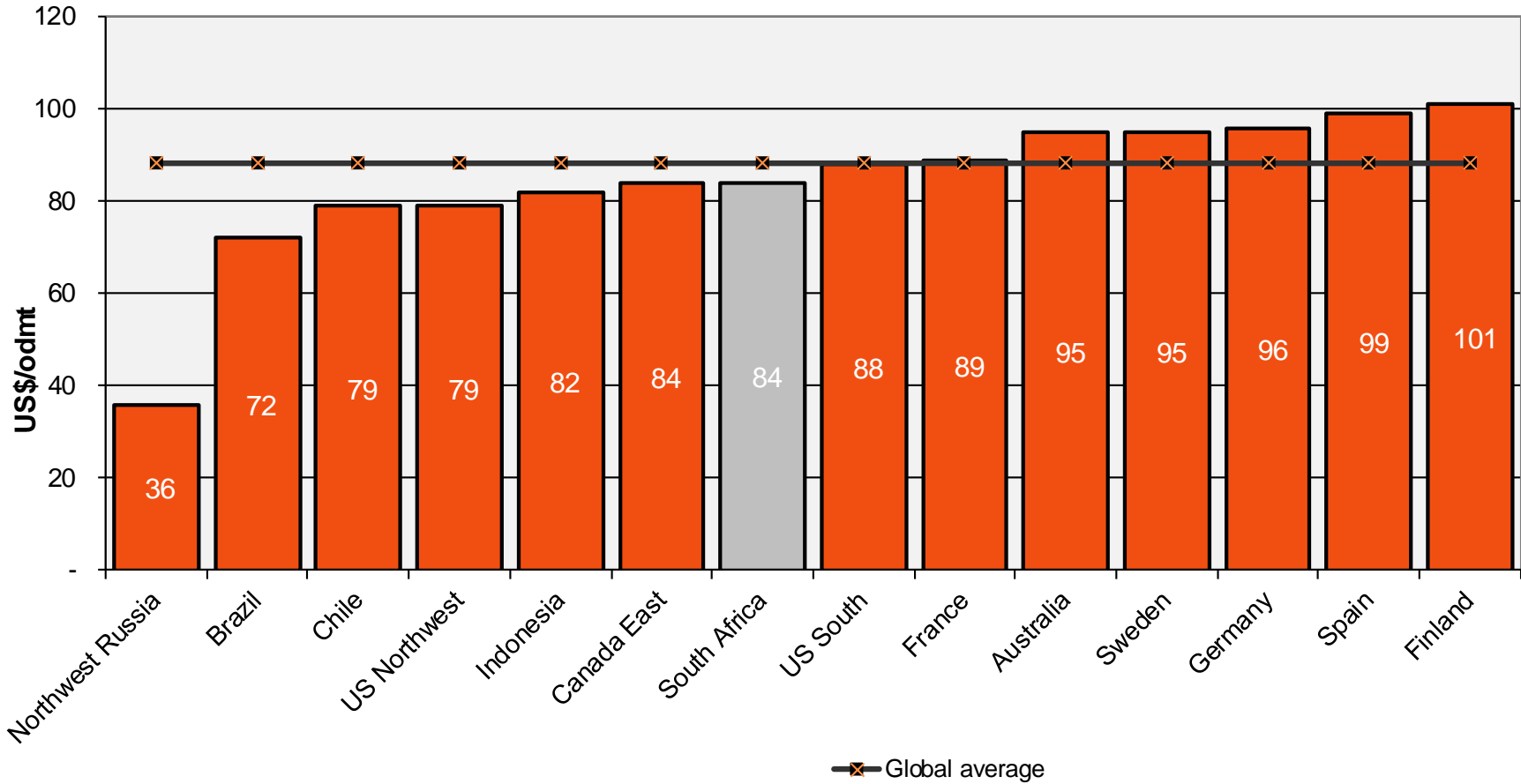


Establishment – Poor Ergonomics



No significant interventions over last 30 years!

International Competitiveness



Average delivered non-conifer pulpwood prices (Q3; 2016)

Modernized Silviculture – The Focus

Safety

- Modernise across all silviculture operations
- Standardise manual & power tools
- Phase out un-ergonomic work and reduce sharp tools

Productivity

- Standardised establishment operations
- Productivity & quality improvements through mechanised & semi-mechanised operations
- Focus on accuracy & quality through increased auditing

Technical

- Steep slope & rough terrain silviculture
- Integrated silviculture technologies (e.g. pitting, planting & fertilizing)
- Focus on value chain solutions
- Cross boundary solutions for high tech, expensive machinery

Silviculture Focus Areas



Exploit best science and technology to ensure sustainable plantations



Residue Management



Serious impediment to mechanised silviculture – Stumps!



Spreading slash - Risks to workers quite obvious!



Burning improves underfoot conditions. But...!



Stump height must be controlled – Impacts on machine productivity and potential for damage

Mondi Destumping Equipment Range



0-20% Slope - Wheeled Option

Above 20% - Tracked Option



Pitting And Planting – A Newer Approach



- Better productivity
- Improved ergonomics
- Hands not exposed to splinters, chemicals and water

Strip Cultivation Project - Savannah EcoTil



Strip cultivation across 18% slope – No surface erosion on burnt site. Good water penetration into rip lines

Semi Mechanised Planting – Flatter Areas



Semi Mechanised Planting – Steeper Areas



Maintenance – Chemical Spraying



Modernising Coppicing Operations



Modernisation – Pole Pruner



Pole pruning at Mt Home – Tree Improvement ‘Pine Park’



Establishment Suite - 0-20% Slope



Destump

Pitting

Pre-plant
spray

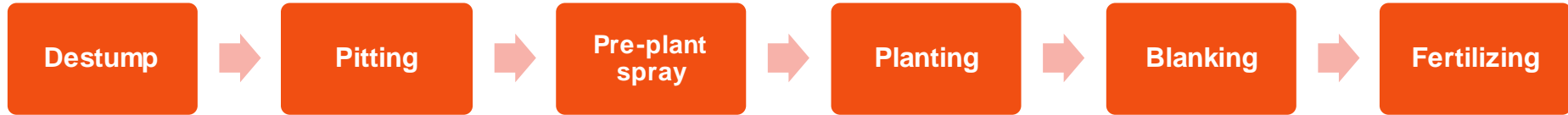
Planting

Blanking

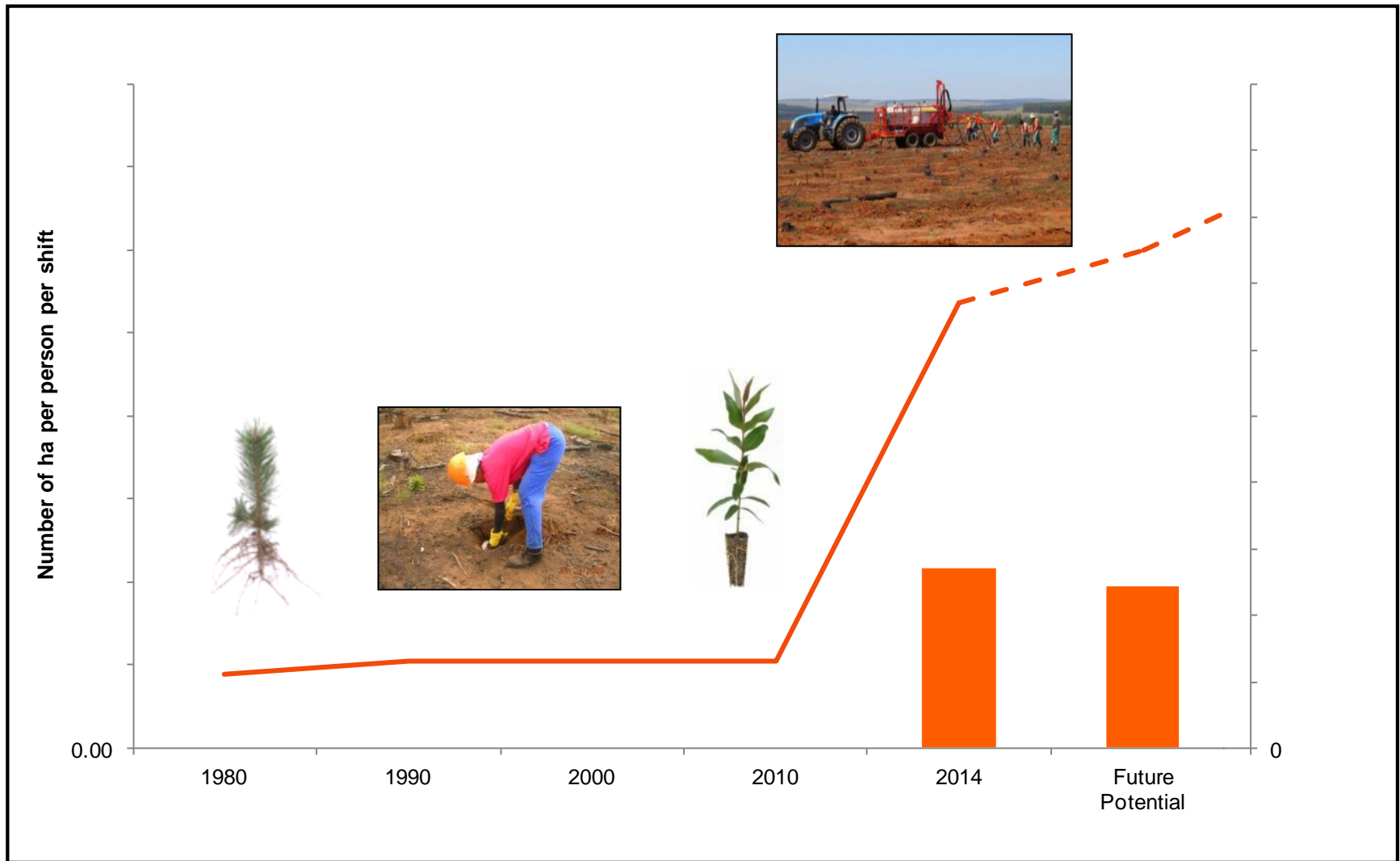
Fertilizing



Establishment Suite - > 20% Slope



Planting Productivity



Fire Strategy – Prevention

Poor fuel load management the greatest threat!



Mechanical Fuel Load Reduction



Equipment Focus



1. Benchmark visit in 2014 to Australia very influential.
2. Safety of crew and ergonomics - Thermal curtains & auto reels.
3. Designed around small crew size of 4 to 5 - Double cab tender.
4. Use of modular designs.
5. Firefighting equipment standardized.
6. Mechanisation of mopping up and fire lines.
7. Use of modular designs.
8. Mini CAFS introduced.



Compressed Air Foam



- Faster fire suppression and excellent post extinguishment protection.
- Increases efficiency and conservation of water supply, especially at large fires.
- Foam clings to surfaces and protects against radiant exposure much longer.
- CAF hose is $\frac{2}{3}$ lighter than water filled hose - Can be pumped higher and further.
- Crew size reduced.



Modernisation Learnings



- Modernisation goals achieved better than anticipated - no significant change in silviculture for 30 years.
- Initial resistance - Not all staff and contractors bought into the programme equally.
- A great degree of innovation contributed by Foresters and Contractors – Absolutely key to success.
- Concerns over impacts of job losses had to be managed carefully – Mondri Zimele initiative.
- Some silviculture equipment did not work as envisaged – accept that there will be failures.
- Develop multi skilled employees going forward.
- New roles and responsibilities for Supervisors – Very challenging.
- Training programmes essential – Severity of potential injuries through mechanisation concerning.
- Productivity studies of modernised operations must remain a key focus.
- Focus on attention to detail and planning - Structured auditing essential.
- You're never modernised – that's an ongoing process!





Thank you!

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