Enterprise Infrastructure for Model-Based Design

Good to Great

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Opportunities of Enterprise-level Model-Based Design

- Enabling scalability
  - Inter-team collaboration
  - Multi-component simulation

- Empowering reuse
  - Designing for reuse
  - Publishing

- Expanding simulations and analysis
  - Parallel
  - Distributed
Agenda

- Managing MBD for scalability
- Sharing reusable tools and models
- Enterprise level simulations
Managing Model-Based Design for Scalability

- Key to scalability is careful management
  - Model reference
  - Interface definition (buses, ARXML import)
  - Simulink Data Dictionaries
  - Simulink Projects
  - Configuration Management integration
Simulink Projects for teams: Collaborate, automate, integrate

- Find and group files
- Standardize tasks
- Promote commonality with templates
- Label items for workflow support
- Share with SCM tools
- Project referencing for scalability
Source Control Management example: Git

- **Common SCM features**
  - Shared location
  - All versions stored
  - Branches, labels, tags

- **Git difference**
  - Designed for distributed development
  - Favors branch & merge over fetch/lock/update

- For models, data dictionaries, .mat files this is tricky
Scalable component management strategy

- Align logical views of the system
  - Model components
  - Simulink Projects
  - Git modules
  - Data
Managing for reuse

- **Challenges to reuse**
  - Location
  - Clarity
  - Status
  - Awareness
  - Interoperability
  - Trust
  
  Simulink Projects, design templates, SCM integration

- **Can we go further for sharing than just SCM?**
Challenge of discovery

- Discovering what?
  - Your own apps
  - Engineering data
  - Models
  - Automation tools
  - Templates

- MATLAB Minimart add-on
  - Package and publish
  - Download and install
  - Versioning
  - Compatibility
Socializing this idea ➔ MATLAB App Store

- Search/filter
- Scope
- Approval workflow
- Component interdependencies
- Ownership
- Download tracking
- Notifications
- User ratings
- Comments
- Recommendations
MATLAB Store at Jaguar Land Rover

- After 18 months
  - 100 internally authored apps and toolboxes
  - downloaded 6000 times
  - almost 1000 users
- Reduce duplication
- Encourage and recognize sharing
- Engineering productivity increased
Challenge of growth of simulations and analysis

- **Scope**
  - component – subsystem – vehicle – fleet

- **Types of tasks**
  - Design of experiments
  - Controller/system optimization
  - Parameter sensitivity analysis
  - Training machine learning algorithms
  - System validation
MathWorks solutions

- Parallel Computing Toolbox
  - Multiprocessor/Multicore
  - GPU
- MATLAB Distributed Computing Server
Conclusion

▪ Optimize your adoption for enterprise
  – Scalability
  – Sharing
  – Speed

▪ Companies are improving in some dimensions

▪ Tackling all will lead to a world-class state
For further information

- Large scale modeling
- Git integration
- Jaguar Land Rover User Story
- MATLAB Distributed Computing Server
- Amazon EC2 early adopter program