

**Minutes of the 3<sup>rd</sup> “AutoMatIC” (Automotive Materials Intelligence Consortium) Meeting**

*Jaguar Land Rover, Gaydon, UK*

*21-22 October 2015*

Attending:

Vesna Savic	GM
David Helmer (Webex)	GM
Denise Massa (Webex)	GM
Arthur Fairfull	Granta Design
Dale Delgado	Granta Design
Dan Williams	Granta Design
Fatih Cetin	Granta Design
Patrick Coulter	Granta Design
Pete Cherns	Granta Design
Stephen Haines	Honeywell Turbo Technologies
Gerry LaRue (Webex)	Honeywell Turbo Technologies
Mark Blagdon	Jaguar Land Rover
Andrew Haggie	Jaguar Land Rover
Neil Gettel (Webex)	Jaguar Land Rover
Peter Seggewiß	KSPG Automotive
Remy Bompont	PSA Peugeot Citroën

**Summary of Actions:**

<b>Minute</b>	<b>Action</b>	<b>Actioned</b>
2.3	Granta to circulate a list of recorded training webinars	Granta
3.5	Granta to report back on User Management at next meeting	Granta
4.9	Granta to schedule 'Find your way around Granta' session at next meeting	Granta
4.11	User stories for Simulation should be grouped according to the four areas proposed in the discussion session	Granta
11.2	Individual votes to be added to the Industry Report	Granta
11.3	ROI section to be added to 2016 report	Granta
11.4	New 'progress indicator' to be added to 2016 report	Granta
12.2	Backup file for welding schema to be circulated	Granta
12.7	Investigate additional sources for welding data	Granta
13.2	See 4.9	-
13.3	JLR to demonstrate user management workflow to Granta	JLR
13.3	GM to demonstrate user management workflow to Granta	GM
13.4	See 3.5	-
16.5	Granta to confirm dates of Spring 2016 meeting	Granta

## Minutes – Wednesday 21 October, 2015

### 1. Welcome/Agenda Review

1.1 Patrick Coulter welcomed members to the 3<sup>rd</sup> AutoMatIC meeting and provided an update on Granta's business.

1.2 Dan Williams provided a reminder of the Consortium process. In the interim period before the October meeting, in addition to ongoing software and project development, members provided 3 inputs: (a) an Agenda Vote for the October meeting, (b) a trial 'User Story' vote, on data analysis user stories, and (c) a self-assessment for the State of the Industry report.

1.3 The results of the agenda poll were presented. Top voted items were Workflow, Capturing Knowledge and Expertise, Data Provision for Simulation, and Materials Selection/Recommendation tools. All items which received 2 or more votes have an agenda slot allocated to them over the course of the 2 days.

### 2. Software update

2.1 Dan Williams provided an update on Granta's recent software developments and plans for the remainder of 2015.

2.2 The summary of recent GRANTA MI updates provoked a discussion about software versions. PSA commented that they plan to move to Version 9 in February and are hoping to be able to install a new version every 2 years. JLR is currently on Version 6 and working on the business justification to upgrade soon. KSPG are on the current version, 8.1, and are expecting to add a new test server to complement their existing production server. GM commented that it takes about 1 month to get a new software version rolled out, regardless of whether it is an 'update' or 'upgrade'.

2.3 A recent improvement in MI Version 8.1 Update 2 to allow the documentation PDFs to be available directly from MI:Viewer for Admins provoked a discussion about training and documentation in general. Granta will circulate a list of existing training recordings. **(Action: Granta)**

2.4 Planned capabilities for MI Version 9 include a new toolkit for building data analysis applications, in, for example, MATLAB or Python. There was a general discussion about the balance between flexibility versus ease of use. It was suggested that in order to get feedback from members on the suitability of potential apps built in MATLAB, for example, they be made available to members in a way that the end user app could be evaluated without requiring a new skillset to be learnt.

2.5 The upcoming 'Collections' capability in MI:Explore was discussed. JLR asked if there were any plans to make collections global, so that they could be published on the server to others by admins. It was suggested that this could be accomplished today using multi-value discrete attributes, to 'tag' collections of records with particular projects or identifiers, so that end users could quickly filter down to the materials in a particular collection.

### 3. Member Update – PSA

3.1 Remy Bompont presented an update on PSA's GRANTA MI implementation. The implementation involves a regular export of material cards to a server from which CAE tools can pick them up. One of the recent additions is a Spot Weld table, which contains tens of thousands of records – this makes import and export difficult. It was mentioned that MI Version 8.1 contains significant performance improvements for the import of data – PSA will benefit from these improvements if they move to Version 9 next year.

3.2 PSA are planning on storing data on processing (casting, forging) and on lubricants and tribology, and would appreciate any best practices or standard schemas to help them do this.

3.3 PSA added a new story to the Simulation epic – the ability to extract data from a CAE model and compare with other data in the database. This ties to the "Capture" area described by Pete Cherns in the previous session – a standardized way to import data from material cards would enable this kind of technology.

3.4 PSA's prime reasons for using Granta are: consistent data sharing/control, easy/quick update of material simulation data, and the ability to capture and secure raw data. The cost of misusing simulation data was used as one of the main Return on Investment arguments.

3.5 User management was raised as a key issue, and seconded by a number of other members. Members require both statistical tools to help understand existing usage and also the ability to restrict access to the software based on usage, so as to ensure compliance with a license agreement. This topic was discussed further on Day 2. Granta agreed to make this a priority area for investigation and will report back on the topic at the next AutoMatIC meeting. **(Action: Granta)**

### 4. Technical Session – Simulation

4.1 Pete Cherns provided a recap on Granta's Simulation solution which is divided into four main areas: (1) Supporting the *Preparation* of data for simulation, (2) Supporting the *Capture* of data for simulation, (3) Supporting the *Management* of data for simulation, and (4) Supporting the *Use* of managed data within simulation.

4.2 Members provided some feedback on the current picture. It was felt that the preparation of data needs to include the explicit workflow of validating material card data – e.g. calibrating a material model by running a simulation of a material test. Vesna Savic mentioned that this was a process she was hoping GM could automate using Granta's planned workflow capabilities, although right now at GM the focus for simulation is on replicating existing processes and supporting end users, so it is premature to start thinking too much about the test data-CAE workflow.

4.3 JLR suggested that in addition to just deploying data, there was a story about re-using data between material models, and that this required thinking about how best to get the knowledge about which data they could use for which models out to users.

4.4 The question of whether to use MI to store finished card data, or to store material 'property' data which could be processed on-the-fly into cards using Granta exporters was debated. KSPG felt

that the exporter method worked well for their use cases, particularly where no crash simulation was involved. However, in many cases, particularly for the OEM members, the data in simulation cards was sufficiently specialized that it makes more sense to manage the finished card.

4.5 Even in cases where cards are stored, there is value in storing the numbers behind the card in some way too – to support use cases such as searching and comparison of cards. An example might be to compare a CAE ‘prediction’ of a stress strain curve against a spread of tests. To do this effectively, additional tools from Granta would help, e.g. the ability to have more control over the formatting and display of comparison charts (colours, line types, legends, etc.) and a reliable way to copy and paste the result directly into a slide deck or report.

4.6 Mark Blagdon from JLR explained that a lot of his time is spent educating end users into why material models in cards are the way they are, and how and why they differ from published ‘datasheet properties’ of materials. He sees an important role for the database in bringing this kind of knowledge to end users.

4.7 Pete Cherns discussed the different methods of serving data up to end users, including MI:Materials Gateway. In general, Gateway was used relatively little amongst member organizations, since it does not fit with the current workflow, where large numbers of material cards are called up automatically by solvers. In order to implement a new process such as Gateway, end users would need to have a clear understanding of why this new process is better than the existing process – something they do not currently have. There may be other disciplines, such as CFD or Thermal analysis, where the number of materials being used is smaller, where Gateway may prove to be an improvement on the status quo.

4.8 It was pointed out that the kind of simulation data you need can vary from discipline to discipline. For example, in Powertrain what is required is often a Minimum Specification value, perhaps to support lifing calculations. For Crash, you require typical properties with upper and lower bounds – and usually highly calibrated and specific material cards. For disciplines like NVH, any data is better than nothing.

4.9 The discussion turned to reference data. In general, members were divided on whether Granta’s reference data could help for simulation—and those who do license data from Granta were not always clear on what reference data was appropriate for what use cases. It was agreed to hold a session at the next AutoMatIC meeting on what reference data is available, and how to communicate its proper use to end users—how to ‘find your way around Granta’. **(Action: Granta)**

4.10 Currently KSPG and JLR deploy some Granta reference data; GM and PSA do not. KSPG have a policy that if you use data from anywhere that is not Granta, you need to go through the process of putting that data into Granta.

4.11 In principle it was agreed that it made sense to group User Stories for Simulation into the four main areas identified by Pete Cherns. **(Action: Granta)**

## **5. Technical Session – Data and Knowledge Management**

5.1 Dan Williams reminded members of the various agenda items which had been combined into this discussion session, ranging from ‘global synchronization’ to ‘capturing knowledge and expertise’.

5.3 Dan presented some excerpts from a presentation given to the Materials Data Management Consortium (MDMC) on Knowledge Management. JLR provided some examples of the kind of knowledge they would like to get to end users, e.g. “What does a Young’s Modulus mean?” “What do we call this material and why?” and “What does this damage parameter mean.” Granta’s Attribute Notes capability was discussed – tools to make this easier to use would be helpful.

5.4 Dan also presented an update on Granta’s Data Updater capability, which will allow the synchronization of all or part of a database from one location to another.

## **6. Member Update – GM**

6.1 Vesna Savic presented GM’s member update. In 2014 GM were focused on a project for Reference Data for CAE; in 2015 and going forwards the emphasis will switch to (a) creating a ‘Base Material List’ for standardized material identification in testing, CAE and downstream to PLM, and (b) test data management for materials. Teamcenter PLM integration is a key part of (a).

6.2 GM also raised concerns about the management of users to support the licensing model. With 1500 users, managing named users in a spreadsheet is not a simple task.

6.3 Vesna expressed an interest in sharing of common Workflow templates, and in shared CAE exporter development.

## **7. Member Update - Honeywell**

7.1 Gerry LaRue presented Honeywell’s member update by Webex. The Automotive part of Honeywell is working in collaboration with their Aerospace side to adapt Honeywell’s existing GRANTA MI database to the needs of the Turbochargers business.

7.2 Although progress has been slow, there has been some success in importing existing material data and models into MI and extending the schema for Honeywell Turbo Technologies (HTT) specific materials models, such as for Thermo-mechanical Fatigue and creep.

## **8. Technical session: PLM Integration**

8.1 Arthur Fairfull presented on the relationship between the materials information lifecycle and the product lifecycle. Considerations include: the changing role of software tools as a product lifecycle matures; the increasing refinement of material definitions as the product lifecycle matures; and the trend towards Model-Based Enterprise, moving from drawing-centric design to PLM-centric design.

8.2 Mark Blagdon pointed out that the material ‘definition’ varies significantly through the product lifecycle—from “that’ll do” to a detailed specification of grade, supplier and manufacturing process. Controlling where people get materials information from during this progression is important.

8.3 Vesna Savic mentioned that GM’s planned Teamcenter integration will have some challenges in the area of material ID translation, as the material definition matures from a generic material to a

precise specification. Considerations like Version Control will be important to understand what version of a material is being assigned.

The first day of AutoMatIC was concluded with a Consortium Dinner at the nearby Walton Hall hotel.

## **Minutes - Thursday 22 October, 2015**

### **9. Member Update – KSPG**

9.1 Peter Seggewiss presented KSPG's member update. KSPG have upgraded to Version 8.1 and are in the process of ordering a second server to use as a test server. Version updates have presented challenges in the past, particularly because KSPG have added their own exporters to Granta reference databases. Peter reiterated a desire he expressed last time to separate unit systems and exporters from databases, so that upgrading a database does not replace your exporters.

9.2 A number of questions were posed to members, particularly on how they quantify Return on Investment. Mark Blagdon commented that JLR is currently working on a detailed ROI analysis for materials data management. It will include a 'flowchart' which follows the various use cases and steps where users interact with the system, and attempts to identify the ROI at each step. For example, it's instructive to ask: "What would happen if we didn't have GRANTA MI at this step?" and see what ROI arguments flow from this.

9.3 Vesna Savic commented that GM see both direct and indirect ROI from their materials data management initiative. Direct ROI includes situations where warranties or recalls could be directly avoided by proving that correct materials information was used. Indirect ROI includes situations where throughput can be increased, or where the business can avoid hiring more people. Arthur Fairfull commented that it was important to articulate a positive ROI ("we have avoided hiring 3 more people") or ("these 3 people can now spend time doing the following more productive tasks") than negative ROI ("we have saved the time of these 3 people" – implying that those 3 people are no longer necessary).

9.4 Other techniques for identifying ROI were discussed, including sessions with various stakeholders and end users to identify gaps or pain points in the current process; and 'storyboarding' scenarios of 'this is how we do it today' versus 'this is how we'll do it tomorrow'.

9.5 GM also raised the point that as integrations become more complex, e.g. integration of Granta with PLM, it's important to understand the ROI of those integrations. For example: what would be the cost to the business if we had a materials data management solution that was not in tune with regular updates of Siemens Teamcenter's material model?

9.6 Pete Seggewiss concluded KSPG's member update with some questions to Granta. An idea was proposed to allow comparison reports which combined multiple data points in the database to statistical summaries in a report, such as a cell which displayed averages and standard deviations of a collection of data points.



## 10. Technical Session – Workflow

10.1 Dan Williams presented an update on Granta’s plans for Workflow and the priority ‘user stories’ which will be tackled during the coming months. A demonstration of progress will be provided at the Spring AutoMatIC meeting.

10.2 GM reiterated that their priority use case was for a supplier approval process workflow although Vesna commented that the materials/CAE groups might be able to take advantage of this capability to support their internal workflows as well.

10.3 Mark Blagdon explained that GM have a similar requirement for Soft Trim testing approvals. Currently they split this functionality between GRANTA MI (where the test data is stored) and eTracker, which is a system that manages the status of the workflows, emails participants, etc. This split is not ideal—it allows, for example, a user to upload test data into MI but forget to mark the work as ‘done’ in the eTracker. This means in extreme cases, JLR could have data sitting in MI for 6 months without the requestor realizing it was ready. An ROI for an integrated workflow system could therefore be based around avoiding repeating work, and implementing more control over people’s work. Key to this would be some kind of reporting/dashboard capability.

10.4 Remy Bompont explained that the main motivations for PSA for an integrated workflow capability would be (i) knowing what’s been done by another team, (ii) having a repeatable, automated process for when a new CAE material card is added or something else changes.

## 11. Industry Report

11.1 Dan Williams presented a draft copy of the 2015 Industry Report. The final version will be circulated once any final changes discussed in this meeting have been made.

11.2 Members were asked whether they were happy with their own companies’ scores to be included in the report. The conclusion was that this was valuable: it would enable members to look at a particular area where they are struggling, and see which members are further ahead. They could then arrange a discussion with those members at the next meeting to find out how they were able to make progress. Granta will add the full score table to an appendix in the report. **(Action: Granta)**

11.3 The 2016 report was discussed. Dan proposed to add a “Return on Investment” section, which captures members’ comments on how to justify the ROI of moving from one step in the industry matrix to the next. **(Action: Granta)**

11.4 It was also suggested that for subsequent years the scoring system may need to be adapted. For example, members might make significant progress in a particular area but still not feel they have moved to the next ‘level’ in the current scoring system. Perhaps there could be a question in the assessment which asks “Do you feel you have made progress in this area in the last 12 months?” That way, we could capture whether an area really is stalled or whether progress is being made actively. **(Action: Granta)**

## 12. Project Session: Welding & Joining Schema

12.1 Fatih Cetin presented the welding and joining database. Example pedigree data for Self Piercing Rivets has been added to the schema since the last demo.

12.2 Vesna asked if members could be sent a backup file of the schema database, rather than accessing it on the cloud. JLR pointed out that if you have an older version of MI, the cloud approach could be useful as it allows you to play with the database when you don't have the ability to install it. It was agreed to circulate the backup file but keep the cloud server running. **(Action: Granta)**

12.3 Fatih asked whether the pedigree of a 'joint geometry', e.g. a single lap joint, or a T joint, is distinct from the pedigree of a 'test type' e.g. a lap shear test or a T-peel test, or is there always a one-to-one correspondence between the geometry of the test sample and the test being carried out. In general it was felt that this 1-1 correspondence was fine, and that the test type could uniquely inform the geometry for a particular company. It was pointed out that the test types would need to be flexible, as some organizations including PSA use internal standards for a lot of their joint tests.

12.4 Fatih asked whether it was important to consider using any standard taxonomies for joint types. Prior to the meeting, Doug Hall of Honeywell had mentioned there were some taxonomies out there that might be useful and Fatih reviewed one such example that had been used in a number of papers published by ASM International. However, such examples tend to have large numbers of joint types, the majority of which are not relevant to the automotive industry, so it was generally agreed that adopting such a taxonomy would not be a high priority for AutoMatIC.

12.5 Fatih asked whether a discrete attribute and an image were enough to capture the failure mode of a test sample. It was suggested that an additional 'notes' field be added to capture any other ad-hoc comments from the lab.

12.6 Fatih asked about how particular simulation data records would be found by end users. PSA explained that in their case, the user does not use MI to find a simulation record – instead all the spot weld CAE records are exported in bulk by an automated process, where they are picked up by the solver. To do this, PSA enforce a naming convention based on material and thickness.

12.7 It was agreed that as well as circulating the current schema, the next step should involve trying to run through a full end-to-end case study, from tensile test to CAE card. Sources for data might include international standards, steel companies and organizations such as TWI. **(Action: Granta)**

## 13. Member Update - JLR

13.1 Mark Blagdon presented JLR's member update. JLR now have over 30,000 records in their database, expanding at around 600/month. Mark showed schematics which outlined the various areas where there is data, and how much of that has been so far developed and made available in MI. JLR have implemented a "Materials Data Hub" which connects information such as test data and CAE card data; a "Validation Hub" which contains information about, for example, supplier validation for paints and trim; and a "Report hub" which collects disparate reports such as Chemical Analysis.

13.2 The very act of putting this overview together has made JLR realize the importance of communicating what's in their database and addressing the question of how end users find what they have available. This includes Granta's own reference data. Database maps can get complex very quickly. It was suggested that at the next AutoMatIC meeting we have a session on both Granta reference data and on communication of database content to end users. **(Action: Granta)**

13.3 JLR's top issue is User Management (See Minute 3.5). Mark presented how JLR currently manage users (via spreadsheet). This is causing significant pain, particularly when JLR have to deny interested users access to the system because their usage might not be enough to justify the perceived cost of the license. Vesna Savic also demonstrated GM's method, which involves a combination of a spreadsheet, a Sharepoint workflow, and a tool by which GM MI admins can manipulate users within Windows Active Directory groups. Dan Williams asked Mark and Vesna if they could demonstrate these processes to a technical Granta audience. **(Action: Granta)**

13.4 Dan Williams commented that user and license management is now a top priority Granta issue – we will report back to the group at the next meeting on our plans for this area. **(Action: Granta)**

13.5 Other issues of importance to JLR include: better integration with Excel; ability to launch Toolbox with a database specified in the shortcut; ability to allow the dynamic creation of new discrete values at time of import.

#### **14. Technical Session – Material Selection / Recommendation**

14.1 Arthur Fairfull led a discussion session on Material Selection and Recommendation. The requirements and current approaches here seemed to differ significantly between members. At PSA, a 'Materials Policy' team determine approved materials. At JLR, there are some processes, such as a paint selection process, which walk the user through a 'decision tree'; but other areas lack a process. JLR are looking at incorporating more materials strategies into the design process, to provide guidance such as "you should be thinking about these materials for a B-Pillar." GM currently has some preferred materials in 'catalogues' and have a longer term goal of incorporating some of this material selection knowledge into their Granta/Teamcenter integration. KSPG have in general more flexibility to select materials, with the proviso that no materials can be selected if they are on a Restricted Substances list.

#### **15. Technical Projects / Shared Development discussion**

15.1 Dan Williams led a brief discussion on technical projects to respond to the agenda point voted by members on 'shared exporter development within AutoMatIC'. In general, Granta is open to a range of approaches: (i) Members fund individual exporter developments themselves and may decide to share with the consortium the results (Granta can facilitate). (ii) Members collectively fund individual development projects with Granta on an ad-hoc basis. (iii) An annual contribution approach, e.g. all members (including Granta) fund 10 days Granta services per year, with the funding spent on highest voted priorities.

15.2 It was discussed whether to continue to work on the current joining schema or broaden into another area, with adhesives/lubricants being the next highest voted. Incorporating adhesives test data into the existing joining schema was thought to be a good approach.

## 16. Wrap up

16.1 Everyone was thanked for a productive and positive meeting. Members were asked for feedback on the meeting content and format.

16.2 The phone dial-in approach did not work well this time – in general a dial-in is going to be an unreliable way of joining. The current policy of allowing members to dial in provided that they send at least one representative in person was agreed to be appropriate.

16.3 It was felt that the user feedback sessions were valuable and should not be shortened; whereas the Granta roadmap sessions were less valuable. Perhaps increase the amount of time for user sessions at the next meeting and select a smaller number of roadmap sessions.

16.4 Dale Delgado asked whether members would be willing to involve Granta customers in other industries. Alcoa, for example, has expressed an interest in participating, and there are other Granta customers such as Molex who supply the automotive industry. It was suggested that we might hold an 'open session' at the next meeting for the supply chain to join and hear first hand from the automotive members what their requirements are for materials information.

16.5 The **Spring 2016** meeting should take place in the US. GM kindly volunteered to host for a second year, and it was felt that the advantages of holding the meeting in the Detroit area, making it easier for members to justify travel expenses, outweighed the advantages of choosing a new location. Granta will investigate dates (such as holding the event in parallel with SAE World Congress again). **(Action: Granta)**

16.6 Peter Seggewiss kindly volunteered KSPG to host the October 2016 meeting in Duesseldorf.