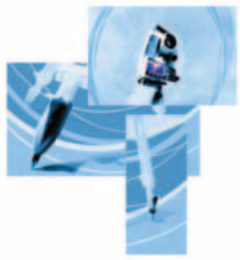


Product development metrics systems

A recent study carried out by Goldense Group, Inc, aimed to collate information regarding the metrics systems of organisations. Bradford L Goldense, president of Goldense Group, Inc, analyses the results.

Does your office use carbon paper or photocopiers for routine document reproduction? Do you use typewriters or word processing applications to produce company documents? Carbon paper and typewriters have, by and large, become redundant: manual, mechanical tools have been replaced by more efficient, flexible and automated technologies. But how do you collect research and development (R&D) and product development metrics and measures? Are you still collecting key pieces of company information at a 'carbon paper' level of automation?

Every product development organisation has a metrics system of some kind. Some systems are simple and manual, some are automated and complex, and there is everything else in between. A primary research study sponsored by Goldense Group, Inc (GGI), asked this key question: what is the structure and technology of metrics systems supporting industry product development and R&D activities?

GGI collected data on metrics systems in industry throughout the five-part 1998 study. The main instrument in the study was a 13-page questionnaire sent out by mail. Over 6000 forms were distributed with 190 usable returns – a response rate of 3.2 per cent.

GGI's objective was to gain hard data from product developers in the following areas:

- The overall visibility and periodicity of metrics in the product development organisation
- The degree of centralisation of metrics systems
- The level of automation of metrics systems
- The roles and responsibilities in leading and administrating product development metrics

The overall visibility

Respondents were asked about the periodic interval that best described the visibility of metrics and metrics reporting in their organisations (see Figure 1).

The most frequent response to this question was 'monthly,' with 51 per cent. About another quarter (22 per cent) answered 'quarterly.' 'Weekly' was the favoured response for 13 per cent of participants, and none of the respondents reported 'continuous'.

These responses suggest that industry is collecting and reporting product development metrics in traditional business periodicity. The result gives an overall sense of the time and emphasis placed on metrics gathering in industry.

What periodic interval best describes the visibility of metrics and metrics reporting at the top level of the product development organisation?

Continuous, I sleep with metrics	☐
Daily	☐
Weekly	☐
Monthly	☐
Quarterly	☐
Semi-annual	☐
Annual	☐
Every 2–3 years, then it dies down.	☐

Figure 1. Periodicity of metrics visibility

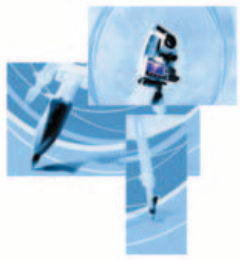
Automation and centralisation

A major aim of the survey was to gauge the degree of automation and centralisation in metrics systems. The questionnaire posed two questions (see Figure 2).

The percentage of respondents checking each box was calculated for each industry segment and for different groupings of respondents based on numbers of full-time employees. Degree of automation is directly proportional to company size and there is a much less dramatic but still noticeable proportionality between centralisation and number of employees.

The industries with a high frequency of vertically integrated, automated systems were the aerospace, defence and automotive segments. These firms produce highly priced, complex products with long lead times. The benefits of speedy, consistent and reliable data gathering in these industries are significant.

Medical product developers reported a relatively low level of automation and centralisation. More than half (55 per cent) of the firms surveyed reported one of the two lowest levels of centralisation, either a 'decentralised-hybrid' or an *'ad hoc'* system. Given the degree of complexity, high standards and regulatory requirements often associated with this sector, one might expect to see greater levels of automation.



The state of architecture of the product development metrics system used at my company can be best described by one term below.

Centralised – single, common, shared, vertically integrated	☐
Distributed-common – top section, linked to a number of like systems	☐
Distributed-hybrid – top section, linked to a number of unlike systems	☐
Decentralised-common – a number of like systems	☐
Decentralised-hybrid – a number of unlike systems	☐
Ad hoc – unlike systems unevenly applied and utilised	☐

The state of automation of the product development metrics system used at my company can best be described by one term below. Please check the best answer. The answers listed below are intended to be mutually exclusive. Only one answer should be necessary for your response.

Fully automated system/database collects and stores metrics – for a number of years now	☐
Fully automated system/database collects and stores metrics – contains 1–2 years of data	☐
Fully automated system collects and reports defined metrics when needed	☐
Partially automated system collects and reports metrics when needed, some manual entry	☐
Partially automated system results from employees preparing periodic spreadsheet reports	☐
Manual system results from professionals presenting data in consistent presentation format	☐
Manual system results from professionals sending in data *ad hoc* or as it occurs	☐
Manual system results from administrators tracking down professionals for numbers	☐

Figure 2. Questions regarding centralisation and automation questions

On the whole, hi-tech firms (those in the aerospace, communications, computers, software, defence, medical products, research/national laboratories, semiconductors and telecommunication industries) tended to report a lower level of centralisation compared with lower tech organisations – 57 per cent of higher tech firms, as opposed to only 42 per cent of lower tech respondents reported the lowest levels of centralisation. Perhaps this is due to the greater project complexity in these firms. Another possibility is that cutting-edge, high-technology firms tend to be younger and less mature.

Some differences were also observed between private and public companies. Metrics systems tended to be more centralised in the latter, with 31 per cent of private firms versus 23 per cent of public companies describing their metrics system as either 'single, common, shared, vertically integrated' or 'top section, linked to a number of like systems.' Metrics systems were more automated in public firms.

Differences also appeared when the samples were divided by sales revenue. Interestingly, organisations with revenues in excess of US$250m had a greater degree of manual entry when compared with companies with smaller revenues.

Product development administration

Who is taking care of metrics gathering and reporting? If metrics reporting is mostly a manual or partially-automated process, then who does the work of gathering the numbers? We asked respondents two questions (see Figure 3).

The largest percentage of respondents (21 per cent) said that the 'vice-president of product development/engineering' was the 'owner' of product development metrics. It is noteworthy that this individual is a functional leader. The next most common response was 'general manager or business unit manager.'

What is especially revealing is that a dedicated engineering metrics function is not leading metrics reporting, it is not shared across functions and it is not a specialised quality function. By and large it is a functional leader, or a top-level senior executive.

It appears that metrics collection and reporting is largely the responsibility of one function (development/engineering) and is a shared task. This argues that a team-based culture has not yet filtered down to the level of metrics system leadership and maintenance. It is still considered a job for engineering/development, and not for the team as a whole. As a cross-functional product development mindset begins to grow, we may see a shift in emphasis of metrics information systems, with either a more specialised or cross-functional approach to metrics reporting.

Metrics information systems

These findings are consistent with the notion that product development competency has not yet found a system of measuring and reporting appropriate to and optimised for its natural cycles and organisational style. Product development metrics are reported monthly or quarterly, systems more appropriate to finance or corporate-level systems. A concurrent product development philosophy, with all its

What department or person is the 'owner' of the product development metrics system? The 'owner' is the person for whom the metrics are prepared for.

CEO/COO/president/executive VP	☐
CFO – chief financial officer	☐
CQO – chief quality officer	☐
General manager or business unit manager	☐
Shared between VP marketing, engineering and manufacturing functions	☐
Shared by VP engineering and VP manufacturing	☐
VP product development/engineering	☐
Shared by direct reports to the VP product development/engineering	☐
A designated person within product development/engineering	☐
Engineering controller/comptroller	☐
Engineering quality department	☐
Engineering metrics department	☐
Company quality function	☐
Company finance/accounting department	☐
Other:	☐

What department or person is the 'administrator' of the product development metrics system? The administrator typically coordinates most of the resources to ensure that the information is being updated and maintained. The 'administrator' is the person who does the majority of the preparing.

Administrators for VP engineering and VP manufacturing	☐
Administrators for VP engineering	☐
A designated person within product development/engineering	☐
Engineering controller/comptroller	☐
Engineering quality department	☐
Engineering metrics department	☐
Engineering information systems department	☐
Company quality function	☐
Company finance/accounting function	☐
Company management information systems function	☐
Other:	☐

Figure 3. Questions regarding ownership and administration

implications, has not come close to achieving its full level of implementation or effectiveness. Periodicity appropriate to one function has been incorporated into another. R&D needs to generate systems proper to product development – and it is (or should be) a cross-functional process.

Metrics systems, by and large, are still manual, or only partially automated, as well as disbursed. Metrics collection is driven by the need to produce periodic reports. It is not an on-going process and few companies build a knowledge base through consistent, automated collection of metrics.

The job of calculating and staying on top of numbers falls to the functional leader of development/engineering, or to a more senior manager. Despite publicity about team-based approaches, product development metrics are still tasked to a functional group rather than the core team leadership.

The report reveals that product development metrics systems are in the embryonic stage of organisational development. They are at a level of maturity in keeping with a reactive rather than a predictive paradigm and a probabilistic rather than a deterministic model. ●

About the author

Bradford L Goldense, is president of Goldense Group, Inc (GGI), a US consulting and education firm specialising in advanced business and technology management practices. He is an internationally recognised speaker and authority on product development and metrics for research and development and product development. He is also the worldwide president of the Society of Concurrent Product Development (SCPD). Visit either www.goldensegroupinc.com, www.soce.org or www.scpdweb.org.