Prototyping as standard practice in financial services

Randall E. Duran
Chief Executive Officer, Catena Technologies Pte Ltd

Manufacturing has long benefited from the use of prototyping in the selection, design, and analysis phases of product development. Creation of scale models and limited-functionality prototypes allows end users to better determine how products will work, far in advance of actual production and delivery. Different designs can be compared and new, untested hypotheses validated. While the financial services industry has developed some limited-scope models, end-to-end business process prototyping is not a comprehensive, industry-wide practice. Historically, barriers to taking up prototyping have been largely related to technology, cost structure, and time limitations. Many of these barriers are now surmountable, allowing prototyping to become a standard practice within the financial services industry.

This article examines how prototyping, as a discipline, can be most effectively implemented in financial institutions to increase overall operational agility, to reduce time to market, and increase the value that financial products provide to end customers. The observations and prognoses presented are based on experience gained over several years, working with financial institutions in North America and Asia to retool and streamline their financial services production lines.

Prototyping as a discipline

Almost one hundred years ago Henry Ford built his prototype of the Model T automobile. Then, as now, prototyping served as a tool for product and process development enabling new approaches and techniques to be tested. While many aspects of what Ford tested were related to physical designs and materials, he also prototyped and tested assembly line production techniques, enabling production of over a quarter of a million automobiles a year in 1915. Beyond Ford's achievements, prototyping has been used pervasively in manufacturing and product development, and it has further extended its reach into related areas such as systems engineering and quality management.

Prototyping has been popular in manufacturing design and development because it enables designers to understand product requirements better and to test fundamental assumptions. Furthermore, it can be used to involve the customer, as well as various participants, in the production processes to identify at an early stage any process or logistical constraints that will affect the delivery. Prototypes can help test how production processes can be scaled up and improved. For management, these benefits translate into lower costs, fewer failures, and higher overall satisfaction with the product.

Beyond manufacturing production, quality and process improvement methodologies, such as Six Sigma, also leverage prototyping. As part of Six Sigma, prototyping helps identify usage patterns and congestion areas, and it provides a vehicle for testing alternative improvement approaches. Prototypes are sometimes used to verify the critical parameters affecting processes, enabling subsequent improvement analyses to focus on the most fruitful areas. Prototyping also supports Six Sigma by producing hard data that can serve as a basis for making product development decisions. Often, such data are required to overcome preexisting biases and opinions that can limit the scope of changes that are applied.

System engineering approaches, such as Integrated Product and Process Development (IPPD), have more formally incorporated prototyping, combining it with modeling, simulation, and rapid development. IPPD's objective is to reduce the time required for design and to ensure that an acceptable product is produced. Prototyping is also used by IPPD as a means of exploring integration concerns, such as the assembly and fitting of product components. Moreover, IPPD's use of prototyping focuses on identifying misconceptions early on so that they can be corrected early in the design process.

While prototyping has been a long-standing discipline in manufacturing, its use within financial services has been limited. It has been used mostly at a tactical level, and is far from being a standard practice for developing broad-reaching financial processes. Given all the benefits that prototyping has provided to manufacturing, it is curious that the financial

services industry has not leveraged it more. Thus, the next section will examine the financial services production environment and evaluate how the benefits that prototyping provides to manufacturing can be best applied to financial services.

The production of financial services

An important aspect of financial services, compared with traditional manufacturing processes, is that the financial processes involve few, if any, physical elements. Instead, processes are the core of financial services production. Most of the physical considerations of financial products are related to documentation, such as applications and contracts, and physical representations of value, such as currency notes, gold, and checks. These physical elements are rarely handled within financial services processes; instead, references — in the form of bookkeeping entries or netted settlements — are used to minimize the effort of handling and transportation. For example, when a consumer pays a bill through a retail banking call center or website, no cash or checks are required to effect the transfer of funds.

Financial services production and traditional manufacturing also differ in how the parent organizations are structured. Relatively few financial institutions have dedicated research and development functions that are focused on developing new products and improving production methods across all stages of production. Thus, most financial service production processes have taken shape over time rather than having been built by design. In part, evolutionary growth of these processes is due to lack of organizational focus on production methods. Also, financial processes are allowed to grow organically because there often is the assumption that financial production processes are easy to create and change, since there are few physical elements involved. Unfortunately, this is not usually the case. Most recently, the credit-default swap market has provided an example of this: inadequate design and testing of the back-office production processes caused a backlog of processing to reach such proportions that the regulators required the industry's 14 top dealers to collectively take action to minimize the possibility of systemic failure.

Furthermore, separations between corporate divisions involved in the same production process can be more pronounced within financial services than with traditional manufacturers. In financial services, organizational divisions that segment production lines are often not driven by production considerations, but rather by factors relating to regulation and compliance. Thus, financial institutions' inherent structures tend to hinder, rather than support, the flow of information that is required to improve end-to-end production processes. In this regard, unfortunately, there is no ubiquitous Integrated Product and Process Development equivalent for financial services.

Despite the differences, there are also many similarities between financial services and traditional manufacturing. One important similarity is that the production supply chains are usually both internal and external. A brokerage, for example, must coordinate information flows between customers, brokers, the brokerage's back-office, risk and compliance functions, the exchange, and the clearing-house to produce a trade. The production processes must address the requirements and limitations of each of these parties to ensure that the trade is processed efficiently and cost effectively.

Opportunities for improving the production of financial services relate to these considerations, and fall into two major areas. Firstly, since the means of production involves people and computers rather than manufacturing equipment and physical goods, there is the opportunity to shift work to computers, streamlining the flow of information, and making it easier to change and enhance those processes over time. The second opportunity is to look at production and design as a holistic process that involves all the relevant internal divisions and external parties. Prototyping can be an important tool for achieving these combined goals.

When a new financial product or processing regime differs substantially from those that currently exist, prototyping can

provide a bridge. Often it is difficult for people, who are grounded in the existing products and practices, to envisage alternatives. For example, shifting an existing back-office operation — which is preoccupied with handling paper, as the basis for their existing processing — to a paperless, workflow-driven model will face numerous challenges related to understanding and accepting the new operational model. Prototyping can be instrumental in addressing these types of challenges. A prototype can help elicit collaborative feedback that serves to identify potential constraints that may limit or hinder new products and processes. Feedback from customers obtained through prototypes can identify missing as well as superfluous features, yielding greater utility of the final product. Regularly testing innovative ideas and eliciting feedback on them is critical for ensuring that a financial institution's operating models remain agile.

Within financial services, prototyping is a tool that can improve overall operational agility and increase the value that financial products provide to end customers. While prototyping has been used somewhat within financial services IT projects and product marketing, and modeling and simulation have been applied to trading and risk management for many years, the use of prototypes to verify the viability of production processes across all stages of the financial services assembly line has been minimal. Many specific challenges have prevented prototyping being used for broad-scale financial process modeling. The next section examines some of these challenges and highlights developments that address these concerns.

Integral prototyping and agile development

Historically, the barriers to the use of end-to-end process prototyping — henceforth referred to as integral prototyping — in financial institutions have been related to technology, cost structure, and time limitations. While technology has enabled great advances within the production of financial services, it has also created obstacles for implementing change. Inflexible and closed legacy systems often limit the products that can be offered and how services can be provided. Integration to and modification of these systems is costly and takes significant time. Sometimes new methods of production are not cost effective due to the integration costs involved.

Integral prototyping can help financial product and process designers understand the true complexity and the scope of integration that is required to implement the end-to-end financial processes. Problems with system integration have plagued many business transformation projects, resulting in high cost overruns, long project delays and, in some cases, complete project failure. Flawed assumptions about the accessibility, completeness, and correctness of process-related information have been the death knell of many innovative initiatives. Discovering these misconceptions in the middle or near the end of the project is usually too late to recover. Integral prototyping can test the validity of assumptions early on, and demonstrate other business capabilities to ensure the overall success of initiatives.

Challenges related to integration complexity that affect entire projects must also be managed within integral prototyping exercises, which have much smaller implementation budgets and shorter delivery timeframes. While these challenges have existed for many years, relatively recent developments allow them to be overcome. New technology platforms and advances in development approaches have all made integral prototyping more workable. Specifically, process orchestration and business process management tools help address integration challenges. Furthermore, agile development methodologies can address cost and time concerns.

Integration technologies have matured over the last ten years and can now be layered on top of each other to tackle enterprise integration problems at different levels. At the base, widespread adoption of standardized software interfaces — such as web services and XML — has greatly simplified the work required to interface with software systems. Likewise, reductions in the cost and size of scanner technology have made it feasible to capture printed information at the source

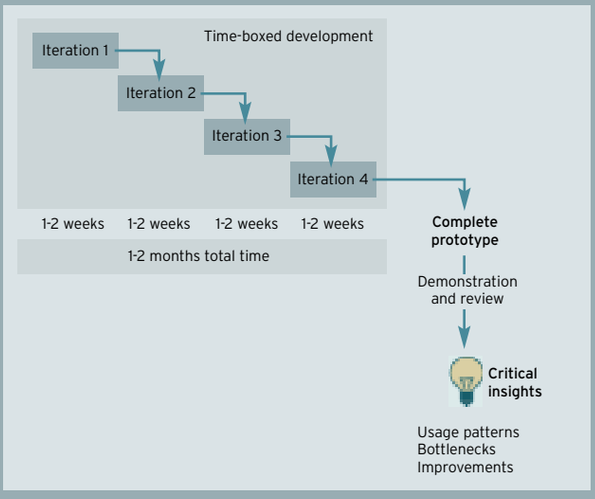

Figure 1 - Agile prototyping

and manage it electronically thereafter. At the next level up, process orchestration platforms provide connectivity between software systems and are powerful tools for transforming and sharing information. At the top level, business process modeling and management (BPMM) tools enable process designers to model, simulate, and execute complete business process flows using software rather than having to train staff to execute business processes manually. These tools enable prototypes to model whole-process workflows that include both software system and people, that are spread across a financial institution, its suppliers, and its customers.

Another advance that has helped enable integral prototyping to gain ground is the use of agile development. Agile methodologies are derived from software development efforts but are applicable to many types of production. Agile development often uses an iterative, time-boxed approach to deliver results quickly and minimize delivery risks. A key aspect of this approach is to produce a working model at the end of each iteration; successive iterations produce more evolved models. This approach helps to ensure that a prototype exercise will deliver useful results within a fixed timeframe and budget, helping to prevent the delivery from being overwhelmed by or lost in planning and analysis.

How agile development works can be illustrated through an example related to manufacturing: a two-month exercise to build a prototype of a hydrogen powered car. The first iteration could construct a frame with wheels and attach an existing gasoline powered engine that is to be converted to use hydrogen. The second iteration would then add a transmission and focus on the engine modifications; the objective of getting the engine to burn hydrogen and power the transmission. The third iteration would link the transmission to the wheels and focus on loading and storing the fuel. The fourth and final iteration would focus on adding steering and improving the efficiency of the modified engine. At this stage the prototype is complete and can be used as a proof of concept. If any of the stages took longer than expected, the iterative cycle could have been truncated early and a working prototype would still be produced.

While integral prototyping is possible without using agile development techniques and the technology platforms, such as process orchestration and BPMM, these tools make it much easier to build integral prototypes and increase their likelihood of success. Having completed a review of the benefits of recent advances that support integral prototyping, the final section will present how it can best be applied within financial services.

An integral prototyping roadmap

Realizing integral prototyping within financial service firms requires identifying suitable targets, gathering resources that are capable of delivering focused, short-term deliverables, gaining buy-in from key stakeholders, and leveraging successes. This section will outline a roadmap for achieving each of these goals in the context of financial services.

Projects that explore new business areas or have significant risk associated with them are ideal candidates for integral prototyping. While integral prototyping will also benefit more

familiar areas, the greatest gains will be seen in those areas that are least understood. Business transformation initiatives, both those championed internally and those led by management consultancies, are one area where integral prototyping can yield great benefits. Often, a major limiting factor for transformation initiatives is the gap in understanding between a new operating model and people's understanding of how existing processes work. An integral prototype can help show people the big picture of what is envisioned; tangible examples at an early stage of the project will help improve understanding and gain broader support.

Likewise, integral prototyping efforts should provide proof of capability across multiple areas that will ultimately affect the success, or failure, of the product. If a prototype just tests normal, limited conditions, it will not be of much benefit. Integral prototypes should test multiple situations — including some that involve complex interactions between multiple parties in the production process — to expose potential risks and test the viability of new, experimental approaches.

Successful delivery of integral prototypes requires a small, focused team that includes both business and technology expertise. At least some of the team members should have experience using agile methodologies for prototyping. This team should also be supported by relevant technology, such as process orchestration and business process management tools. In some cases the organization may have purchased these tools already; in other cases they may be provided on an evaluation basis from the technology vendors for the scope of the prototype effort.

Getting buy-in for integral prototyping is easier when put in the context of how it benefits the stakeholders. For management it provides greater assurance that the production methods and goals are achievable and worth pursuing. Prototyping can allow competing products and designs to be compared side-by-side at an early stage of development. For the customer, internal or external, it provides a preview of what will be provided and gives a chance to address any misunderstandings about the requirements early on. For project management and IT, integral prototyping will help decrease the delivery risk of the planned production process. For operations, it will help validate the production approach to ensure quality problems and other operational issues are not encountered later, when production rates are increasing.

Presenting an integral prototyping effort as the first phase of a planned project or as a pilot system may be more palatable for the stakeholders. Sometimes red flags go up in people's minds when terms such as 'prototype' and 'proof-of-concept' are used; they may be concerned that the result of this effort will be thrown away or it will not produce sufficiently measurable results. By framing the exercise as the starting phase of a project, it can be positioned as something that will be built on top of, rather than thrown away. Framing the exercise as a pilot project, which will be put into limited production use, can also alleviate concerns by ensuring that customer and operational feedback will be captured.

Building momentum is paramount; the best way is to start with smaller opportunities and build on the resulting successes. As the benefits become apparent and people become comfortable with the approach, it will gradually become standard practice to develop integral prototypes for new products and production methods. The onus over time should shift from asking the question "why would we want to create an end-to-end prototype" to ask instead "why would we not?"